Mike Haiduk

1956

Michael P. Haiduk

INTERNATIONAL TRACK & FIELD DIGEST

NATIONAL
COLLEGIATE
TRACK COACHES
ASSOCIATION ★

CLINIC NOTES

FIRST INTERNATIONAL TRACK AND FIELD COACHES CLINIC

Berkeley, California, U.S.A. Monday, June 11, through Wednesday, June 20, 1956.

DISCUS - 190'
JAVELIN - 265'
HAMMER - 185'

Mike Haiduk
1016 Southworth Terr.
Kalamazoo, Mich.

INTERNATIONAL

Michael . . Haiduk

TRACK & FIELD DIGEST

Michael P. Haiduk

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PREFACE

This complete report of the First International Track Coaches' Clinic, held in Berkeley, California in June, 1956, is without doubt one of the most important pieces of literature on Track and Field ever published. The material has been contributed by world authorities, not only in the field of coaching, but also in medicine and psychology with the purpose of exchanging vital information for the further development of Track and Field around the world.

So many people have contributed to the tremendous success of the clinic and the publication of this INTERNATIONAL TRACK & FIELD DIGEST, that it is impossible to express adequate thanks to all of them. We must single out a few, however, for special mention. The originator of the plan of the International Clinic, Lloyd "Bud" Winter of San Jose State College and his "good right arm" Mike Ryan of the Santa Clara Youth Center spent endless months organizing, planning and seeing the clinic through to a most successful conclusion. The University of California served as the perfect host for the occasion. Mr. Harold E. Howland of the U.S. State Department was particularly helpful in making it possible for many of our foreign guests to take part in the clinic. Phil Diamond, our Recording Secretary, spent many weeks transcribing, editing and proof-reading the hundreds of pages of manuscript. Then of course, there were the many European, Asian and American coaches who gave generously of their time and talent to make it all possible. To all of them, our sincere gratitude.

When I agreed to publish the Clinic Notes through "Champions on Film", it was realized that the job would be somewhat more complicated than that of producing our yearly 50-60 page booklet of NCTCA clinic reports. As you can see, this volume is many times larger than our usual publication and contains far more illustrative material than ever before. The cooperation of coaches all over the world, however, has made the task of assembling it particularly rewarding. The prompt and eager response to our urgent requests for additional information, added material and pictures has been most gratifying and has been a very important factor in enabling us to meet our January 1957 publication-deadline.

All proceeds from the sale of the INTERNATIONAL TRACK & FIELD DIGEST, will be turned over to the National Collegiate Track and Field Coaches' Association with the hope that the funds will provide the initial impetus toward an even bigger and better Second International Track Coaches' Clinic in Rome, Italy in 1960.

Don Canham

Track Coach, University of Michigan
Ann Arbor, Michigan, U.S.A.

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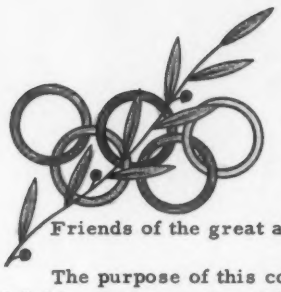

INTRODUCTION

By Chairman Lloyd "Bud" Winter
San Jose State College

Friends of the great athletic fraternity. Today a visionary dream becomes a glorious reality!

The purpose of this conclave will be to exchange the latest scientific and practical ideas of track and field. We are gathered here in order to improve the interest and techniques in our sport throughout the world.

The United States coaches will teach some but, I am sure they will also learn much.

The fine social intercourse that will be engendered can only tighten the bonds of brotherhood among all nations and is an equally important reason for holding such a meeting.

This idea received its inception after the last Olympic Games in Helsinki. Here the spirit of friendliness, neighborliness and good sportsmanship so dominated the proceedings that it moved our head coach, Mr. Brutus Hamilton, to the prayer that the fine lessons and examples, unlike the Sunday sermon, should not be forgotten on the following Wednesday.

All the great leaders of the world, almost without exception, can be quoted to the effect that is is a fine thing for the youth of the world to meet in friendly rivalry on the playing field of sport.

To quote from President Eisenhower:

"Consider the mountains of mistrust and misunderstanding that would disappear if the peoples of the world would exchange visits, information and ideas--"

And so with the universal longing for peace and goodwill among nations it is our high duty to carry on in any way we can to preserve the Olympic ideal.

If nations can test their strength on the field of sports it will be a match that will elevate mankind, give incentive to noble spirit and contribute to the well-being of the world.

If nations test their strength on fields it often leads to opposite results. It is my humble and sincere conviction that on the field of sport we might find the one common ground on which nations of the world might get together.

And so today, if, in our exchange of news, information and ideas, we can realize some of these ideals, then, indeed our project is worthwhile.

It is my pleasure to greet and welcome the foreign coaches. It is our sincere wish that your stay here is a happy and profitable one.

Just like the first Modern Olympic Games, we are a little loosely organized, BUT IF the important thing, as de Coubertin put it, is not in the victory but in the struggle, then we are on the way to success because we have struggled.

We hope that you will return home as torch bearers--with the flame of goodwill burning in your hearts, and that it will continue to burn there long after the Olympic Flame has been extinguished!

INTERNATIONAL TRACK & FIELD CLINIC, 1956

WELCOMING ADDRESS

By Prof. Eric C. Bellquist
University of California

I am honored indeed to have the privilege of opening and welcoming this first International Track and Field Clinic and, in so doing, to represent the President, the Chancellor, and the Faculty of the University of California. We realize that we are only providing the space, and some services, and that this clinic is sponsored and organized by the coaches and officials of the NCAA. They are the organizers and the hosts--we at California only provide the facility. In so doing, we want to express our appreciation and compliments to the organizing committee and particularly to Mr. Winter of San Jose, who has done so much to inspire and promote this meeting which, we trust, will prove successful and thereby permanently establish an International Clinic of Track and Field Athletics.

In these remarks I am privileged to speak for the Chancellor of the University, and for the Faculty of the University. As the Faculty Representative on the Executive Committee of the Associated Students of the University, moreover, I have some authority to greet you in the name of our students. Unfortunately, the term ended last week and the summer session will not begin until next week, so you will not have an opportunity to see much of student life on the campus. I regret this because I think many of our foreign, and even American, members of the clinic would have been interested in observing the extent of student self-government on the campus. Their budget for these activities approximates a million dollars. It is they, the students, who own and administer the building where you met yesterday afternoon and last night. They publish the daily newspaper. They employ the officials you met yesterday, the Executive Director, the Director of Athletics, and the coaches. They with advisory boards - on which they have representatives and usually chair - plan and administer a huge sports and activities program for the whole campus and are, just now, planning for a new and adequate Student Union building or buildings. I have seen many university campi in this country, Europe, and the Far East. At none of them have the students had as much to say about so much. This is a policy of the Administration and Faculty of this University. The Administrators and the Faculty are firm in their belief that this is an important aspect of University life, that this provides sound training for responsible leadership in public and private affairs.

Having this honor, I not only wish you welcome but--in the true California spirit--not going so far as Texas would, however, state that I think it is appropriate that your first meeting be held here. Mr. Winter, your planner and organizer, is a graduate of this University. In this area you will find a real appreciation for track and field athletics. It may not be as sophisticated as you will find at a track meet in Stockholm or Helsinki, or in provincial towns in Sweden and Finland, but on the part of press and spectators I think you will find it as high as anywhere else in the United States--as you will witness on Friday and Saturday. I doubt, moreover, if at any University in the United States you will find this more true. The President of this University was a track man. The Vice President of the University for Business Affairs won his letter in the low hurdles. One of the President's assistants was a quarter miler and low hurdler. Another was captain of the track team and ran the high hurdles. A key officer in the Office of Relations with Schools, who will be on leave for a year to serve at Harvard, won the pole vault at the London Olympics. A responsible officer in the Extension Division threw the Javelin. The Chancellor of the University, whom I represent this morning, was a track man at Swarthmore. I was a rather good half miler in high school and, like other members of the faculty, did as well as I could in collegiate competition. On this campus we have six or seven Nobel Prize winners. One of them, Glenn Seaborg, is the University's representative to the Pacific Coast Conference. Another, Wendell Stanley, head of our virus laboratory and who only last week suggested a new approach to research in the causes of cancer, never misses an athletic contest when he has time to attend them. The Dean of our College of Business Administration, and former head of the Academic Senate and top faculty man in all academic exercises, never misses a ball game, track meet, or other key athletic contest. Most of these men you will see and meet, as they officiate at the NCAA track meet. The President of the University himself, always officiates at our track meets at Edwards Field when he is free to do so, and usually makes certain that he is free to do so.

I have taken the liberty to mention this in order to assure you that in the facilities which we are providing for this first International Clinic in Track and Field Athletics you can count upon the support not only of our students, athletic staff employed by them, employees of the university, faculty, but the top of our administration--the Chancellor and the President. These men have been athletes, track and field athletes, and continue to be interested in the sport which you are here to study and promote. I have the privilege of knowing all of them, and of being familiar with track and field athletics on this campus since 1923. All of the men I have mentioned participated in the sport which we represent at this clinic. All of

them were real amateurs. None of them had a subsidy because of that participation. All of them, could they be here this morning, would testify to the effect that their having been track and field athletes furthered the careers which have led to the posts they now hold. In short, right at this University, your first host during your stay in California, you can count upon sympathetic understanding for everything that this clinic represents and hopes to accomplish.

In this vein I would add one observation. In your reading of the sports pages and, occasionally, even headlines on the front page, you have noticed stories on the short term of life or service of athletic directors and coaches. In Sweden, to be sure, Gosta Holmer has served longer than probably anyone else present at this meeting. In this country, however, the turnover is rather rapid. I would point out that on this campus during more than a half century we have had only two track coaches. Walter Christie, whom you will meet on Friday and Saturday, served from 1902-32, thirty years. What his age is now no one knows, but it may be in the late eighties or early nineties. His memory of races in the 80's or 90's is not now quite exact, but he is still a good physical specimen and, reputedly, can still play an acceptable game of golf. Brutus Hamilton succeeded Walt Christie when he retired in 1932. He was then a young man and is still a young man. I have had the privilege of running under Walt Christie and of knowing Brutus since he came here nearly a quarter of a century ago. Mrs. Hamilton has headed our Committee that cares for more than a thousand foreign students, ten per cent of our enrollment, on this campus. While serving with our government overseas I again met the man who trained the Swedish team for the 1912 Olympics, staged in Stockholm. We sat down together and sent a post card to Walter Christie, against whom he had competed as a professional sprinter in the 1890's. In 1949, while serving with the United States Embassy in Stockholm, I had an opportunity to witness the American team competing against Scandinavia in Oslo and then to see the coaches and athletes as they proceeded to Sweden, Denmark, and Finland. At the time I wrote an official dispatch to the U. S. Department of State commenting upon the impression that Brutus Hamilton and his boys had created in Northern Europe, and the assistance which he had received from the Pittsburg coach with us at this meeting.

I commented upon the tremendous good will which these coaches and athletes had created for the United States and urged that the United States Department of State would take official cognizance of this major factor in advancing better international relations and harmony among states. While I was commended for these reports to Washington, nothing happened until the 1952 Helsinki Olympics when in track and field, rowing and other sports we had a demonstration of what could be done under the concept of the Olympics developed by the Greeks--and furthered by the best example of what can be done by a small nation in the field of sports, Finland. By then the soil had been prepared and it was tilled by Mr. Winter and the others responsible for this clinic. We, at this university, sincerely hope that with this initial impetus provided by the NCAA, the planting here done will be fertilized and grow, and that the trees sprung out of this soil will prove as sturdy as those which provide the timber for so much of the world from Northern Europe--from which we still have so much to learn.

I have spoken too long already, but in these words of welcome want to emphasize a few points before your professional deliberations begin.

1. We are convinced that international interchange in the field of athletics provides one of the most fruitful avenues of reaching the masses of countries and for cooperation towards peace and understanding.

2. When track and field teams meet in international competition, it is not the major meet that is important. It is the splitting up of these teams, a few athletes competing in numerous meets in the host country, that brings the direct people to people contact that is so desirable and fruitful. To illustrate, in the area which I know best: It is not the American team with Brutus Hamilton and Carl Olson competing against the Scandinavians in Oslo in 1940 that was important. It was these coaches and a few men competing in provincial towns in Norway, Sweden, Denmark and Finland, that created the contact with the people which was so helpful. It was not the Stockholm 1912 Olympic Stadium that was important but rather the impression made in Eskilstuna, Gefle, Tunavallen, Visby, Turku, and Slottsskogvallen that counted. Moreover, it was at such places in such competition that the records were set-when the pressure was less great.

3. In this sport, more than any other, the small nation has an equal chance with the great powers. I do not mean by this that Finland or Sweden can collect more points at Melbourne than the Soviet Union or the U. S. A. I mean rather that in our sport the individual counts in a way that is not true in any other athletic competition. After all, remember the 1500 meters at Helsinki in 1952! Remember the record of the Finns and the Swedes at several Olympics. Remember, too, that Belgium produced Hermann, Gaston Reiff, and Roger Moens. Remember that a small island of Jamaica at one time gave us Wint, McKenley, Laing, and Rhoden, and that Norway raised the level of hammer throwing by Strandli and middle distance running by Boysen. And where would the world be in the javelin without the lessons we have learned from

the Finns? In California, good javelin throwers hardly ever exceeded 200 feet until many years ago a Finnish champion made a visit. During the next three weeks you will see Held, Young, and many others--at distances formerly restricted to the Finns and Swedes. In teaching comparative government and international relations, I have often made a plea for the small states. In no other field, perhaps, can one present so convincing a testimony of their contribution and justification--as track and field athletics.

4. This should encourage new nations, now for the first time seriously developing track and field programs. Brutus Hamilton has told me of the warm reception which he had in India. Yesterday we heard testimony of the success of the Albritton visit to the Middle East. Mr. Winter has performed an important mission overseas. Despite the proficiency of American discus throwers, we still wonder if the perennial Consolini of Italy will not rank high in the Olympics. But, after all, Italy's interest in and development of track and field can be dated from the time that a track coach from the southern part of this state spent several years coaching in that country. We are pleased that at this clinic we have coaches from Pakistan, from Guatemala, and from other states where until recently interest in this sport has been slight.

5. We regret that there are no coaches here from the Soviet Union, where developments in this sport have been great in recent years. We would like to hear about the training methods of Anoufriev, Denisenko, Kutz, Krivonosov, and other top athletes. We are pleased, however, that we will learn something about what has been done in some of the other states in these areas. After all, when Hungarians break eight world records and the four-minute mile in one year something must have happened in that country and when Poland produces a javelin thrower of world standing there must be interest in our sport in that country as well. Perhaps the gentleman from Czechoslovakia can enlighten us on these developments, and go beyond his discussion of the great running of Zatopek.

6. Somehow track and field coaches, athletes, and the public response to our sport is something unique, intimate and fraternal. In what other field does one see the same community? We are all pleased, whatever our nationality, when France suddenly produces a great javelin thrower, when Hungary emerges as a major power in track, when an American discovers how to throw the hammer, when the Japanese learn how to pole vault and do the hop step and jump, and when the Poles can throw the spear and also do the steeplechase very well. There is no jealousy among us when the best miles in the United States are run by Australians and Irishmen. National competition in track and field may at times be intense and I can well understand what it means to the Finns when they beat the Swedes in a dual meet. Even so, I am convinced that in no other sport are the words of Baron de Coubertin taken so seriously. You all recall his restatement of the purpose of the modern Olympics: "The important thing....is not winning but taking part. The essential thing in life is not conquering but fighting well."

Towards that end we are all here together. I am sure that in being here together this message will become even more significant. I am sure, too, that during your stay on this campus together--and as you continue to Bakersfield and Los Angeles, this message will be the one you will carry home. We here at Berkeley are here to help you in any way that we can towards that end.

TRACK AND FIELD AROUND THE WORLD

By Brutus Hamilton
University of California

As host coach here at the University of California, may I add my word of welcome to all of you, especially to you gentlemen from foreign countries and to those who have come long distances to be with us. May you all have a pleasant sojourn here in Berkeley; learn a little about a lot of things, a lot about some few things; make many stimulating and lasting friends, and return home with an expanded knowledge of sports, better able to serve those who look to you for guidance. It is my hope that you will count your days spent here and at Bakersfield and Los Angeles among the most beneficial expenditures of your life, not only because of what you hear, see and learn, but also and especially because of happy friendships formed.

In a sense, we are a fraternity, we coaches, athletes and sports fans. We speak a universal language, just as lovers of art do, as those who love beautiful music, great dramas and universal poetry do. Every nation on this earth has contributed something to make life fuller, more beautiful and more enjoyable for all of us. The scientists and physicians of each country have contributed something to make life more comfortable by easing pain and mending bodies. We are all citizens of the world and anything which we can do to help our fellow man is a worthy and noble achievement, even though it be only in teaching him to run a little faster, jump a little higher or throw things a little farther. And these meetings, which bring representatives from theends of the earth together for a friendly common purpose can serve in a small way, we hope, to harmonize people and to help cement the brotherhood of man in keeping with the Olympic ideals of Baron de Coubertin ! and as conceived by the spiritual leaders of all of our religions.

It is an old saying that the future hope of the world lies more in mutual understanding among peoples than in any economic or political formula or in any military alliances. The statement will bear repeating now as we begin our deliberations and discussions in this First International Track Coaches' Clinic. For I firmly believe that they do also serve this good purpose who merely run and jump and throw things. I believe, too, that we also serve who coach. The Olympic Games at Helsinki, with the gracious Finns as hosts, provided a sweet breath of fresh air in the international atmosphere. I'm certain that Melbourne, toward which the eyes of the world will soon be turned, will provide the same, with the equally gracious Australians as hosts.

The topic assigned to me by Coach Winter is "Track and Field Around the World". I shall use the subject largely as a means to parade a few of my observations and prejudices before you. It is gratifying, though, to see the great growth in interest in track during the past forty years.

In 1920, only the European countries, the United States, Canada and Australia were keen on the sport. The South American countries and Japan made great strides in the 1920's and now track and field is firmly established there. The great upsurge of interest in Russia and the brilliance of their performances in the past several years has been amazing. India, Pakistan, China, several nations in Africa now are developing remarkably. One doesn't need to project himself too far into the future to visualize even more international competitions, and even greater performances and interest.

In this regard I should like to tell a story. It's an old story and was first told by Aesop some 2500 years ago. It has to do with the eagle and the arrow. As the eagle fluttered to earth he noticed that the arrow which gave him his mortal wound was guided by feathers from his own tail. "How often," Aesop reflected, "do we contain within ourselves the means of our own destruction." There is no need for me to belabor the point of the moral. We can all visualize the deadly feathers which are present now, and which may develop in the future, to guide the arrow into the heart of amateur sports. We are obligated to destroy these feathers as they start to grow if we are to have wholesome and beneficial amateur competition and if we are to save sports for future generations.

Another gratifying thing about track and field around the world is the willingness of all coaches and athletes to exchange ideas. There are no secrets in techniques, psychology, diet or training methods. Anyone from any country is willing and anxious to share his knowledge. Zatopek, Bannister, Landy, O'Brien, Gordien, Warmerdam, Haegg, Owens, Whitfield, to name only a few. Coaches, too,

are publishing articles so nothing is held back in our field any more than it is in medicine or surgery techniques.

Each nation around the world has its own peculiar problems in regard to track and field. Weather, space, finances, diet and national support all vary in our different countries. All of us in the Northern Hemisphere have a common problem of getting our teams to Melbourne in the best possible condition. It is a challenging problem and will require a bit of doing, but the difficulty is not unsurmountable. There are precedents which have been successful. Also, the countries from the Southern Hemisphere have been coming north in their off-season and performing brilliantly.

I should prefer to devote the remainder of my time discussing the common problems faced by all coaches around the world. We face the problems confronted by all teachers. First, we must know our business, be familiar with the best training methods and the most modern techniques. Then we must create an interest and enthusiasm in the events on the part of the athletes and then finally to direct that interest and enthusiasm along the lines of sound fundamentals, imaginatively, intelligently, purposefully and even inspirationally. It sounds rather easy and simple, but it isn't.

No matter how much a coach has read, studied or observed, there will come times when he must sense things beyond his experiences and intuitively apply a new approach. Each individual is different, and it's hard to generalize about anything as evasive as a human being. Someone once asked a voice teacher what method he used in teaching his pupils to sing. "I have twenty-five students," he said, "I use twenty-five different methods." No coach has the time to make his teaching quite that personalized, but it would be good if we did.

I wish I could point out some easy road, some primrose path, up the road to athletic success. But after more than thirty years in coaching young men, I'm afraid I have nothing more romantic to suggest than purposeful, planned, imaginative, enthusiastic and inspirational work - and some of the work must be hard. It need not be unpleasant work, however - it can be joyous and it should be if the best results are to be obtained. And it must be sustained over a long period of time. Gordien had thrown the discus sixteen years before he reached 170 Warmerdam had vaulted ten years before he cleared 15'. Zatopek didn't become a champion overnight. Early in his career he suffered many defeats and it was not until several years of apprenticeship that he began to set his amazing records. O'Brien, although only 23, has probably thrown the 16 pound shot more often than any man in history. He is a terrific worker and a very intense competitor. A lesser man than Landy would have given up after failing to qualify in the 5000 and 1500 at Helsinki. But his defeats made him all the more determined, and his performances since then will always be a bright page in athletic history. Above all, then, the athlete must never give up. He must keep his enthusiasm.

Cynics will say a man is foolish to devote so much of his time and energy to sports. They have a point and merit an answer. In the first place, the time required is greatly exaggerated. One doesn't need three or four hours a day. A well-planned work-out not to exceed an hour and a half a day should be enough; and many athletes require even less. Amateur sports must be kept in proper perspective, and generally they have been. One could cite hundreds of cases of students who excelled in sports, but who also prepared themselves academically for a life of service. Bannister, Landy, Carr, Eastman, Jimmie LuValle, Archie Williams, and hundreds of others. One can cite hundreds of young men who hold down responsible jobs and still have time for good performances in track. This is especially true in Europe, where many of the competitors are beyond college age No, a wholesome sane participation in sports is not a waste of time. On the contrary, it can and does open up wider horizons for the competitor, gives him a host of friends, and increases his opportunity for service later in life. Besides, it's a lot of fun. I know of no Olympic Champion, or of any Olympic athlete from any country, who has turned out to be a bum. They all seem to be doing well.

Every coach around the world faces the problem of psychology. Later in these meetings you will hear a learned talk on this puzzling subject by a gentleman from Austria. I think perhaps we are on the borderline of great discoveries in this field and in the field of nutrition, within the very near future. I suspect these two fields, together with new and improved physiological training methods, will be the great contribution of you young coaches during the latter half of this century. There will be improvement in form and technique, of course, but in my opinion they will be minor as compared to these other fields.

The longer I coach, the more I am convinced that the mind, the will, the determination, the mental approach to competition is of utmost importance. Not only in races, but in field events as well. I saw Meadows win the pole vault in the Berlin games on a vault where most everything was wrong. He planted his pole too late, he pulled too quickly, he went over the bar parallel to it, but he was so determined to make the height that he cleared it. I saw Warmerdam do the same thing in creating a world's record of 15'2" at Modesto, which he subsequently bettered. I saw Lindy Remigino, a rank outsider, win the 100-meter at Helsinki and for the three glorious weeks following that victory, he proved himself in the post-Olympic meets the fastest runner of that time. I saw the late Eric Liddel win the 400-meter at the Paris Olympics in 1924 only because he was the most determined in a field of determined runners. All of us have seen men of average ability, who will and strive to be something other than average, succeed in athletics. We have seen it in other walks of life as well. We coaches don't understand it as yet, nor am I certain the psychologists do, but this motivating power of the mind is a force we all reckon with and a power which we all, directly or indirectly, try to direct.

It is well for us to study the form of the champions such as you shall see here this weekend and at Bakersfield and at Los Angeles. But we should not neglect the pluggers, those men who will never reach championship or world class. Most of the athletes we coach will be in this latter class. And it is these 'little men', these also-rans, who are the backbone of track and field. It is they who have sustained the sport; it is they who will keep it alive for future generations, with the help, of course, of their tall brothers, the champions and record holders. In this regard I would like to say in passing that I regret that the International Olympic Committee has set such a high standard of performance for entries at Melbourne. It seems to me that it's out of keeping with the Olympic ideal.

I left Helsinki after the '52 Games feeling refreshed and ennobled in Spirit. I had seen Nobleness walk our way again for one brief fortnight. I had seen the young men and women of the world compete in spirited contests without a single unpleasant incident to mar their competitions. I had seen them overcome the handicap of language by speaking the universal language of sports, of music and the dance.

I thought of the words of the Prophet Isaiah who said, "How beautiful upon the mountain are the feet of them that bring glad tidings." I dare to hope that the flying feet at Helsinki, at Melbourne, at Rome and at other gatherings of international sportsmen may bring glad tidings of a better and more understanding world.

An English poet in World War 1 outlined the architecture for peace in a few brief words. "Would you end war? Create Great Peace!" he sang.

I like to think that we men meeting here exchanging ideas, methods and techniques are doing something more than that. In a broad sense, we are trying to do our little bit in creating The Great Peace the poet sang about.

PROGRESS IN TRACK AND FIELD ATHLETICS

by: Ken Doherty
University of Pennsylvania

There is every indication that American track and field performance during the next three weeks and in the 1956 Olympic Games will be the greatest in our history with a greater percentage of improvement than ever before. It would almost seem that we might relax a little in our "national" effort and feel rather satisfied with our progress.

The fact is that in terms of national planning and national effort, we have only made a beginning. After visiting in other countries of the world during this past year, where thinking and action are at a more national level, I am very much aware of how far we are from achieving our real potential. It seems to me now that aside from the once-in-four-year planning of a few men in a sort of temporary advisory capacity, this apparent "national" team performance is actually the accumulation of numerous isolated and individual efforts in which the main consideration is whether "I" will break a world's record or whether "my" university will place a man or two on the American Olympic team.

Further, should we be inclined toward self-satisfaction, what is true of actual performance is not necessarily true of our progress in understanding and developing best techniques of track and field or in knowing how best to teach those techniques. New styles or new emphasis on certain details of style do occur from time to time, new methods of training for endurance are being developed and yet it is my certain opinion that such new methods have not kept pace with performance. One can find strong support for the argument that this national improvement in performance has resulted much more through greater intensity of work over more months of the year, and through more years, especially at the high school and younger age levels but to a certain extent at older ages also, rather than as a result of improved techniques or a clearer knowledge of men and of how they learn most efficiently. In any case, it is clear that a faster rate of progress could be made and should be made whether we do it out of our personal pride as coaches or because we feel that America must do so if she is to maintain her place at the top of international track and field.

Fortunately, it is not difficult to discover ways of accelerating our progress. First let us admit that as a national coaching group, we have done almost no thinking about the over-all problem. We do not need to look further than this very clinic for an answer and simply do a great deal more and even better what is being done so very well right here. This clinic has been a very tough assignment for those administering it, for Bud Winter as our National Vice-President and clinic chairman, for Payton Jordan, our President, for Mike Ryan, who has done so much of the ground work, and for many others. But even before we start we know it will be a great success and worth all the planning and time and energy that it has cost. The key to this clinic and to any national plan for improving our track and field program lies in just such active cooperation and flexible planning, in a working together of all those persons who have interests and problems related to our sport. In that one phrase, "working together of all related persons" is the gist of whatever I am trying to say here this morning.

Such cooperation must begin within our own groups, a more active sharing of knowledge and methods between coaches. We are more than willing to do this, of course, not only our own coaches, but those from abroad as well as is demonstrated by their presence and their good will here. But it is necessary that someone coordinate that willingness as has been done here, some organized and qualified group needs to take the initiative and stimulate this willingness into action. What is happening in this clinic needs to be expanded not only in terms of more clinics in different sections of the country, but also in terms of subject matter as well. It is not enough to know better techniques; we must also know more economical ways of teaching these techniques.

Not so long ago I heard one of the men in this room talk on the subject, "Better Ways of Coaching Track and Field in Less Time." He opened my eyes to the fact that I was doing a very poor job of coaching in terms of economy of time, energy and effectiveness. He said that learning first of all depends upon motivation. That's not new, of course, but his emphasis was new. It depends upon the desire not merely to do one's best in general, but specifically each day and for each effort, and that each day's practice was performed at the highest level of interest and determination to do one's best. This is essential for each individual, not merely for the best man in each event. It is this maintained and individual desire that must be planned and encouraged much more than the details of theoretical training schedules.

The question is constantly asked, "What kind of training program should a man follow?" One that is consistent with modern practice, of course, but more importantly, one that the athlete believes in and understands as HIS program and HIS means to success. It is not enough that the coach should understand the "why" of such a training program, much more important that the athlete should understand it. It is not coincidence that many of the best talks given before the NCTCA have been by athletes. Our very best athletes are likely to be thoughtful men who understand the "why" as well as " "what". Such understanding and awareness by the athlete is the best means to effective coaching.

Again, this coach emphasized the necessity of distinguishing between essentials and non-essentials of training or form, of being tough when stressing fundamentals but of ignoring individual variations that do not make a difference. As long as the running program or the style of a particular athlete is basically sound, non-essential details can be ignored. The April issue of "Track and Field News" carried an article on "Interval Training" which stressed exact measurement of every phase of training. Many thought the article was good, yet in the May issue Landy wrote:

> "The present craze for rigidly running laps at certain speeds, with time trials, etc., is admirable perhaps for beginners. But it begins to pall after a while, and I am quite sure that it is not necessary once you have had some senior running experience... I now run without a watch, in bare feet or rubber soled shoes, always on soft grass, without track or distance, and at constantly varying speeds or distances."

Contradictory though these statements may seem to be, they agree in a fundamental belief in hard, consistent work, gradually increased as condition improves. But the real point of this discussion is that we need a greater exchange of such knowledge between coaches experienced and successful in these problems and those of us not so fortunate. This applies not only within our own country but also between the coaches of different countries, as we are demonstrating here in this first International Clinic. In the various track and field magazines I have been receiving in the past year from Germany, Sweden, England, Finland and Russia, there appear quite frequently picture sequences or articles from American sources. We need to make similar use of the excellent material by foreign coaches available to us in magazines and textbooks from abroad.

Pursuing further this list of recommendations for active cooperation, there needs to be a closer relationship between the membership of the NCTCA and the American Association of Health, Physical Education and Recreation. Somehow the tradition has grown up in this country that coaches and physical educators have nothing in common, are even opposed to each other in certain instances. This is as silly as to suggest that physiologists and psychologists are natural enemies when obviously both groups are attacking a single problem from two interdependent points of view. Physical Education has to do with muscular fitness and the teaching of big-muscle skills. That's our job too. The AAHPER is sufficiently concerned to have established an Athletics Section and to have appointed a head varsity coach as director of the research activities of that section. Such groups can be of help to us in our work and we to theirs.

Next, there needs to be more active cooperation between the individual coaches and the NCTCA on the one hand and the medical doctors and their related organizations on the other. There is a rapidly growing movement in the world called "Sports Medicine". It is not new; in some countries of the world it is some twenty-five years old. Certain European universities have a department of Sports Medicine as a regular part of the medical school curriculum. There is an International Federation of Sports Medicine which meets at least every fourth year in connection with the Olympic Games. Further, there is an American College of Sports Medicine, founded in 1954 and listing among its membership some of the most noted physicians, physical educators and physiologists in the country. Its main purpose is to "promote medical studies dealing with the effects of sports on health." Without our active support such an organization can easily make health the all-important end and be interested in sports only insofar as they can contribute to health. With our help this tendency can be avoided and the NCTCA and Sports Medicine can work together in discovering and furthering the inter-relationships between sport and health.

But quite apart from such organizations, there needs to be a much closer relationship between ourselves, individually and as a sports body, and individual physiologists and psychologists. There are a few such men with us today from whom we shall hear in the next few sessions. They are all too few in number and all too little time will be devoted to the excellent material they have to give us. Their potential contribution is tremendous, not merely in terms of gaining an inch in the high jump or taking a second from the time in the mile run, but what is more important, in helping us to understand these

human beings with whom we work. In turn, we can be of great help to them. Let me quote from a letter written to me recently by one of these scientists:

> "As a former coach, as a trainer, and as a scientist working on problems in collaboration with coaches, it is my general impression that coaches have much to offer scientists interested in the advancement of human performance and welfare. Coaches working every day with selected individuals and attempting to achieve maximum performance in sports become highly familiar with the elements which make for success and those which represent limiting factors. Scientists working with humans in laboratories do not have this wealth of observation. Coaches originate new methods of training and caring for athletes, which in themselves represent dramatic discoveries in the nature of the function of the human body. . . .
>
> "I feel that much could be gained by promoting among coaches the attitude that they have both a great deal to give and a great deal to learn from scientific and medical personnel and educators. It is up to the coaches to take the initiative in promoting this somewhat new relationship, and I am sure they will find that scientists, physicians and educators are ready and willing to work together with them. It is the responsibility of coaches to define clearly how they want to work and then take the leadership in setting up appropriate seminars and other collaborative programs."

One of the finest examples of such cooperation between coaches and scientists lies in the speed with which weight training has been accepted as a supplemental work in our sport. Only five years ago weight training was taboo. Such speedy acceptance could not have occurred if advocated by individual coaches or athletes working alone or if advanced by individual scientists divorced from practical athletics. As a matter of record, Dr. C. H. McCloy told us repeatedly some twenty-five years ago that strength was the most important single element in most athletic performances but his statements were by-passed for two decades largely because we coaches assumed that physiology and physics have little to do with actual performance on the sports field. Now, within the short space of five years, weight training is accepted through the combined work of the research laboratory and the progressive athlete and coach. As a matter of honesty and accuracy, I believe it was the athletes rather than the coaches that did most of the experimenting and reporting of results.

We have a tendency to assume that we know a great deal about our sport and how it is best coached. Yet last week I compiled a list of over a hundred questions in track and field for which we now have no satisfactory or factual answers. The other day I received the results of a survey of such a relatively simple matter as how to train for the 440* Some eighty coaches gave their training schedules for their most outstanding quarter-milers, men that averaged better than 50 seconds in performance. There was little agreement among these coaches, not merely in details but in basic ideas. The range in method was very marked, with workouts varying from repeated 660's during the late meet season to repeated all-out sprints as soon in the year as muscle condition would allow.

If we continue this method of trial and error by individual coaches and athletes, with everyone jumping on the bandwagon of the current national or world's champion, our progress may be slowed in certain instances by as much as decades. The shot-putting world has suddenly adopted the style of one man on the assumption that his many new world's records are primarily the result of his new way of facing the back of the circle. Other men adopting this style have made similar improvements and shot-putting has made more gains recently than during any previous comparable period. The exact style of O'Brien may well be an advance over the forms of previous putters, but it could just as well be incidental or even detrimental to ultimate performance. The true explanation of the success of this style could lie in the adoption of harder work methods over more months of the year, or in a different attitude toward ultimates in the event, or in the greater awareness of the value of strength and strength exercises. I am not saying that O'Brien's form is less effective; I am saying that we just do not know and yet we have taken actions that assume we do know. The truth will be discovered only through the combined efforts of scientists, coaches and athletes, working together.

Another area in which progress in American track and field must be made lies in post-college competition. To discuss the weakness of this phase of our national effort is to waste time; we are all

*Editor's Note: The results of this survey are to be found elsewhere in this volume.

aware of it. Unfortunately, almost no one is sufficiently concerned to do much about it except to decry the lust for comfort and pleasure that characterizes our society. It is easy to say that it isn't our problem as college track coaches. On the contrary, it is our problem just as much as it is the problem of our universities to provide graduate and post-graduate education. We need college extension coaching as well as college extension courses. Many of us are free of duty (and salary) during the summer. Our tracks are entirely idle just at the time when European tracks are most used. A national program to harness this manpower and equipment could do much to improve not only our Olympic team but our national physical fitness as well. For example, to schedule a series of dual meets between an American National Team and such countries as Russia or the combined teams of the Scandinavian countries would create great interest and gradually lead to a full schedule of summer post-college competition just as the needs of our 1956 Olympic team will stimulate an increased summer and early fall program for many other athletes as well.

I have one final point to make in this listing of means to progress in track and field - in my opinion, the most important point of all. The task of the coach of student-athletes and amateur athletes is not merely to discover and use means to all-out performance, much as we all have a tendency to think just that. Actually our job is to discover the means to best possible performance within the limitations of a set of unwritten agreements commonly and carelessly called the "amateur code". This code is not a matter of high-flown impractical idealism. Belief in and practice of its limitations is necessary if we hope to preserve our sport as an activity in which the many millions of people of the world can continue to participate on a fair and equal basis and with some hope of success. Once we remove all limitations not only in reward but also in time and energy than can properly be devoted to preparation for competition, we have removed ourselves from thos activities those contribute to the direct betterment of mankind. We shall have become mere trainers of human machines and puppets that will interest and entertain others less talented and less disciplined and thereby demonstrate our own cleverness and power.

I believe that in coming decades the greater and more accurate knowledge which we shall gain from scientific investigations will permit us to train men much more exactly and precisely than is now possible. We shall be able to bring performance in both practice and competition very close to true physiological limits. It is certain that various tests, perhaps of the circulatory or ventilation systems, made before and after practice by trained physiologists working closely with track coaches will permit us to know just how much and what kind of practice is most beneficial, much as we now use mechanical motor testing machines in checking the electrical or carburetion systems in our motor cars rather than relying solely on human judgement. It is equally certain that practical psychologists will help us to understand and to train the minds and attitudes of men with a much higher degree of precision and effectiveness than is possible today when we, for the most part, use just "good common sense", whatever that is. If other areas of American endeavor, engineering, agriculture, medicine, were still using only "good common sense", we would still be crossing wooden bridges by ox-cart, spreading seeds by hand and using leeches for ulcers.

Many people are seriously disturbed about such a "machine" approach to the training of human beings. But if we accept amateur limitations, if we realize that all of us, whether in these United States or in other countries of the world, are coaching men who are first of all students and workmen, active in other college organizations and duties or involved with their families as husbands and providers, if we plan so that their athletic practice and competition is limited to the hours and energies left over from these more important endeavors, then there is no serious dangerof an "inhuman" approach. Bannister must have worked hard, must have achieved a very high level of condition, yet he was able to use only the hours left over from his medical school studies in his successful efforts to break the four-minute mile. This week I was delighted to read Landy's statement in "Track and Field News":

> "I am sure it isn't necessary to train five hours daily to win an Olympic title. Even a daily average of $1\frac{1}{2}$ hours, with absolute concentration, could achieve the desired result."

It is almost unbelievable how much work can be done without undue fatigue within a 90 to 120 minute period if practice is maintained throughout the year and a gradual increase in the amount of work is carefully planned. Men, over a long period of time, build resistance to fatigue, both mental and physical, and are able to do large amounts of intensive work that was formerly considered impossible or at least superhuman. A Landy will run "up to twenty quarter-miles with a rest period of about 200 yards of jogging between each" and repeat a similar workout the next day and every day with

"no days off for rest". A Stampfl will recommend three or four fast repetition runs at 1-1/4 miles with ten minutes of restful jogging between - all within less than two hours of practice time. A period of two hours is sufficient for any amateur sportsman. To grant him special privilege in the form of more time away from his work, from his studies or from his services in the armed forces is to encourage an all-out attitude and opportunity that should be possessed only by professionals and which will destroy our sport as we know it and love it.

In summary then, progress in track and field in the United States is potentially almost unlimited. We have hardly begun to organize nationally and use our resources in manpower - not only in relation to number of participants but also to number of years each individual participates. For the first time, sports in our country are facing a triple challenge from both within and without: from within, the indication of increased acceptance of professionalism is added to certain evidence of a low state of muscular fitness among our people; from without, the exciting challenge of a strong national competitor over whom, in all good sportsmanship, we intend to win. Such challenges to a young and naturally vigorous people are certain to rouse us to an adequate response but to do so will require the active cooperation of all related persons, those in sports, those in physical education, those in medicine, those in sciences related to sports - all working together within the limitations of a realistic code of amateurism.

Now to bring my talk to a conclusion, I wish to make six recommendations for whatever action this group may care to take later in its sessions:

First: This clinic or type of clinic, with its tremendous potential, should be continued and even expanded by the NCTCA no matter what its cost in time, energy and money. Out of it should grow an International Track and Field Coaches Association with benefits to track and field throughout the world, not only in terms of better techniques but even more important, in terms of friendship and good fellowship between the coaches of all nations. From such an association there should develop a permanent International Track and Field Center for the interchange of information, both scientific and experiential.

Second: When we have our future NCTCA clinics or when we organize similar clinics in our home states or cities, we should increase our efforts to secure persons doing research in related sciences. The NCTCA should have a permanent budget to cover travel expenses of such persons. Further, we should encourage such scientists to work on problems that concern us and our sport and give them all-out cooperation in providing subjects and materials for their research.

Third: There should be more complete reporting of the talks and papers given at such clinics. To do so on a shoestring and as an incidental duty is no longer justifiable. We need a salaried secretary of the NCTCA responsible for the job and provided with an adequate budget. We need a regular publication such as a supplement to that wonderful paper, the "Track and Field News", so that track articles and related research can be reported promptly throughout the year.

Fourth: There should be a permanent research committee required by the Constitution of the NCTCA which would cooperate actively with the International Center suggested earlier. It would summarize the problems in track and field on which research can and should be done, survey the extent to which research on these problems has already been done in foreign countries as well as the United States and in such related areas as industry and the armed forces, and finally stimulate research in colleges and by individual scientists in areas indicated.

Fifth: The NCTCA should go on record in this year's business meeting as being interested in the development of the science of Sports Medicine and express its desire, both individually and as a national coaches' association, to cooperate actively in furthering the inter-relationships of sport and health.

Sixth: The NCTCA should go officially on record as believing:

a) That a justifiable code of amateurism must be based upon a personal sense of honor as being above all other considerations.

b) That sports can never be primary in the life of an amateur and must be kept secondary to the athlete's vocation, studies, or other major activities.

c) That amateurism can be made realistic only if it is considered no more and no less than an agreement among competitors by which they try to secure fair and equal competition.

d) That such fair and equal competition depends upon the practice of certain limitations: limitation of reward, for it leads to excess in all ways, but equally important, limitation in the time that can properly be devoted each day to preparation for competition.

e) That appropriate national and international bodies should seek means to further a positive and realistic program of Education FOR amateurism, not as the mere negation of professionalism, not as a means to personal, institutional, or national glory but as an honorable and honored code of conduct in sports.

PRINCIPLES OF COACHING AND TRAINING TRACK MEN

By Clyde Littlefield
University of Texas

It is a good policy for coaches to study and learn all they can about the human body. We are training growing boys. The more we know about their development, how their bodies function, etc., the better the results. It is impossible to handle all men alike. They have different bodies, environments, and characteristics. We find that difference in the methods used in training Cunningham and Santee of Kansas, Bannister of England and Zatopek of Czechoslovakia; and in the high jump, Steers of Oregon and Davis of Texas A & M.

We have passed through many years of experience. Leaders in Physical Education have given us many good ideas about coaching and conditioning men of all types. Their ideas are correct. The results have been the best.

We start our training as early as possible. It is this slow process of training that has given our boys the best results. Condition constitutes the chief factor of a track team's success. Therefore, training should be begun early and along right lines. The build-up process should start long before the day of competition. Someone has said the way to teach a man how to run is to make him run. It is true that an athlete must run to improve, but it is bad in that it gives the idea that the only way to train is by running. A few coaches work their men too much, and these men become physically and mentally stale.

Many of our boys get a great deal of splendid training in games, such as basketball and tennis. Any outdoor exercise, where men can play and enjoy the work, is good for distance men. The men do not realize they are getting in shape for their runs. Outdoor games in the off-season keep men in shape the year around and make them most valuable to the team "in the long run." If our boys are not taking part in football or some other fall sport, we require them to come out for exercise at least three times a week. The men are given a definite schedule. All of the runners, except dash men, go out for cross-country running or walking. If not good enough to make the team, they take the lighter exercises. Our men learn how to take the different exercises that help develop form and coordination of muscles. They use these in the earlier practices throughout the fall and spring.

Track meets and contests are won in the training days, getting ready for the actual competition. It is a wise coach or contestant who leaves nothing that can be done in advance for the day before the meet. The writer has seen athletes come to the State Meet, run a mile or jump six feet the day before the championships, to find out if they were ready. Good generalship in track athletics lies in planning far ahead for the contests which are to come. Good track teams are not made in a hurry, and the slow, gradual development is usually the best.

It pays to be conservative when you are taking stock of your material. Underrate your men a little. The boys are more enthusiastic when they see improvement rather than going backward. A few coaches expect too much from their men. We start our intra-squad competition after four or six weeks training. The men must be in fair condition. In the first competitions we want just medium results. It is better to start from a fair mark than to be good and gradually go downhill the rest of the season. Of course, if we are getting ready for a good meet and want to be at our best, we hurry along in the training and try to keep the boys in condition the remainder of the season.

When taking stock of material at hand, it is always well to figure on your second, third, fourth, etc., place men. The first-place men are what you want, but remember first-place men might slip back; the lower places win points and meets, and above all, remember these men help to make your future teams.

It is well to watch your opponents, know when they start training, learn their names, and note their records. Learn how your competitors compete. Are they consistent, etc.? The men get a great deal of pleasure doping out the results of their next track meet.

As soon as you have had a few competitions among your men, it is wise to have a preliminary meet or two. This will give you an idea of the condition of your men and put them under competitive pressure. In these meets, it is not usually wise to make records or enter your men in too many events. Keep your opponents guessing, and try to win with men they do not know about.

Our student managers keep a record of the early competitions, and the meets are always run off exactly like a regular meet. The records are kept for future references.

We find that our men work out best in groups whenever possible; that is, all our milers in one group, pole vaulters in another group, etc.,. It creates a team spirit. Each man helps another. Pushing each other has a tendency to develop better men into the best condition.

It is true, there is not as much teamwork on a track team as on football or basketball teams. Although it is largely a matter of individual performances, to have a spirit of unity in the team is helpful. Get the men to feel that they must all pull together, and in meets they will work for points rather than for individual glory. Relays help to build up team spirit.

It is good to plan meetings once a week where the entire team comes together. Friday is a good day if competition is held on Saturday. At these meetings members of the team bring up points of value to the group. The coach may talk about plans for the next day and discuss events and training methods.

The most important thing to develop in a track and field man is the habit of doing his best in competition. Some coaches make the mistake of calling for trials frequently during the week. The writer finds that a man should become accustomed to the doing of his best every Saturday in competition. This is the reason for meets when men are in condition. We often find a great deal of fun in having the men compete in events other than the one they are working for. This also helps to keep the men in a good mental condition.

Another reason why the coach should never let a man do his best, except in Saturday afternoon competition, is that the athlete will do better if most of his time is devoted to trying to improve his form. The athlete will thus develop much better co-ordination, timing, and control of his speed. He will not form bad habits trying for speed or distance but will gain in the cultivation of skill and promptness which give more muscular power with less energy. If he does his best each day, he will neglect his form and deaden his muscles.

A general plan for a week's workout is here suggested:

Monday--Warm up well, working out the soreness from Saturday's competition. Work on form in each event, a few starts for all men. Do not work for endurance. All field men practice on event.

Tuesday--Speed work, shorter distances than event for speed and pace in regular event. Hurdle and field men practice starts. Do speed work with six to eight starts. Take exercises and work on events other than ones to be competed in.

Wednesday--Work hardest of any day during week. Double up on distances with slower pace than in regular race. Practice on form. Hurdle and field men work more on form.

Thursday--Endurance work, longer distances than regular event. Build up strength. Field men and hurdlers work on exercises and distances at three-fourths speed.

Friday--Very light work and warm up. Later in season complete rest for meeting day.

Saturday--Competition as in a meet, with a time schedule. This is an outline that may be used after four to six weeks of training. It varies with individuals and weather conditions.

The general plan for working college men does not always fit the high-school boy. It is well to take the systems of training and make them suit surroundings and environment.

An instructor or coach should learn the right principles of form in each event. He should satisfy himself that he is right in his belief and then not change his opinion readily. If he finds he is wrong, he should not hesitate to change. The big coaches are continually learning.

There is a general principle, right for each event; but also remember men have individual differences. It is often necessary to modify the form for certain men. If men are getting the principle of form in an event but fail in many minor details, it is well not to try to change them, especially if they are getting good results.

The coach should learn to do each event fairly well himself, so he can demonstrate proper form. An athlete will learn very rapidly if you show him what to do. He many never get it if you merely tell him.

The coach does not need to be good in the events. The lesson is well taught if he shows how to do the event. The writer learned how to perform in certain events by going over the back fence for practicing and by studying. You can use good men to demonstrate to others. Take your men to see a meet--explain how a certain event is performed by watching men in that event. The football coach often uses younger coaches or his best men to demonstrate blocking. Action pictures are good. Action diagrams of champions and slow-motion pictures are a great aid in teaching men.

It is well to concentrate the men on one or two events. Men are often used in too many events. If the athlete had picked out his best event, maybe he would have made as many points and at the same time would have been a better man. One of the great problems in coaching track and field is to find out where the men can perform the best. It is always a good plan to try them out in several events, especially if they show promise. It is well to note that men often develop for another event through the work in some event. The coach often finds his man is much better in an event after a couple of years of experience in another event.

Always study the order of events and run your men to best advantage. Study how much time is given between events. Can a contestant repeat in the second race? Could he get more points by running in one event or two events rather than three? Take the events as they come. Do not pull your men out of races unless you know what they can do in later events. Never have a man go into a race to run with instructions to save himself for a later event. It is better to have him run the race and, if necessary, have a team-mate slow him down near the finish. Always have men win as easily as possible unless out for a record.

Train your men to depend upon themselves. Do not accompany them to the start or to the point where they are competing. It is well to plan ahead. Confidence comes to men by learning more about what they are trying to do.

It is a good plan to have the men stay together during the meet. Have them dress together. This plan will help the nervous men and make a better spirit. The men who come late on the program should stay off their feet and loosen their clothes until the time to warm up for the event. The coach should be cool and watch every chance to aid his men to get points in the meet. Remember, a track coach needs to steady his men, not drive them. The time to win races is to start early in training methods.

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We find that our men work out best in groups whenever possible; that is, all our milers in one group, pole vaulters in another group, etc.,. It creates a team spirit. Each man helps another. Pushing each other has a tendency to develop better men into the best condition.

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The most important thing to develop in a track and field man is the habit of doing his best in competition. Some coaches make the mistake of calling for trials frequently during the week. The writer finds that a man should become accustomed to the doing of his best every Saturday in competition. This is the reason for meets when men are in condition. We often find a great deal of fun in having the men compete in events other than the one they are working for. This also helps to keep the men in a good mental condition.

Another reason why the coach should never let a man do his best, except in Saturday afternoon competition, is that the athlete will do better if most of his time is devoted to trying to improve his form. The athlete will thus develop much better co-ordination, timing, and control of his speed. He will not form bad habits trying for speed or distance but will gain in the cultivation of skill and promptness which give more muscular power with less energy. If he does his best each day, he will neglect his form and deaden his muscles.

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Friday--Very light work and warm up. Later in season complete rest for meeting day.

Saturday--Competition as in a meet, with a time schedule. This is an outline that may be used after four to six weeks of training. It varies with individuals and weather conditions.

The general plan for working college men does not always fit the high-school boy. It is well to take the systems of training and make them suit surroundings and environment.

An instructor or coach should learn the right principles of form in each event. He should satisfy himself that he is right in his belief and then not change his opinion readily. If he finds he is wrong, he should not hesitate to change. The big coaches are continually learning.

There is a general principle, right for each event; but also remember men have individual differences. It is often necessary to modify the form for certain men. If men are getting the principle of form in an event but fail in many minor details, it is well not to try to change them, especially if they are getting good results.

The coach should learn to do each event fairly well himself, so he can demonstrate proper form. An athlete will learn very rapidly if you show him what to do. He many never get it if you merely tell him.

The coach does not need to be good in the events. The lesson is well taught if he shows how to do the event. The writer learned how to perform in certain events by going over the back fence for practicing and by studying. You can use good men to demonstrate to others. Take your men to see a meet--explain how a certain event is performed by watching men in that event. The football coach often uses younger coaches or his best men to demonstrate blocking. Action pictures are good. Action diagrams of champions and slow-motion pictures are a great aid in teaching men.

It is well to concentrate the men on one or two events. Men are often used in too many events. If the athlete had picked out his best event, maybe he would have made as many points and at the same time would have been a better man. One of the great problems in coaching track and field is to find out where the men can perform the best. It is always a good plan to try them out in several events, especially if they show promise. It is well to note that men often develop for another event through the work in some event. The coach often finds his man is much better in an event after a couple of years of experience in another event.

Always study the order of events and run your men to best advantage. Study how much time is given between events. Can a contestant repeat in the second race? Could he get more points by running in one event or two events rather than three? Take the events as they come. Do not pull your men out of races unless you know what they can do in later events. Never have a man go into a race to run with instructions to save himself for a later event. It is better to have him run the race and, if necessary, have a teammate slow him down near the finish. Always have men win as easily as possible unless out for a record.

Train your men to depend upon themselves. Do not accompany them to the start or to the point where they are competing. It is well to plan ahead. Confidence comes to men by learning more about what they are trying to do.

It is a good plan to have the men stay together during the meet. Have them dress together. This plan will help the nervous men and make a better spirit. The men who come late on the program should stay off their feet and loosen their clothes until the time to warm up for the event. The coach should be cool and watch every chance to aid his men to get points in the meet. Remember, a track coach needs to steady his men, not drive them. The time to win races is to start early in training methods.

THE PROMOTION OF TRACK AND FIELD ATHLETICS

By Lloyd S. Swindells,
British Columbia Branch, A. A. U. of Canada.
Coach-- Canadian Pan American Games Team.

The Promotion of Track and Field is most comprehensive and it includes two main parts which are a must for successful promotion.

1. ADMINISTRATION OF TRACK AND FIELD ATHLETIC MEETS.
2. DEVELOPMENT OF A CONSTRUCTIVE TRACK AND FIELD PUBLIC RELATIONS PROGRAMME.

Mr. R. J. "Bus" Phillips, Athletic Director, University of British Columbia, collaborated with me on the Administration of Track and Field. Mr. Phillips was Meet Manager of the British Empire and Commonwealth Games.

Mr. F. N. A. "Fred" Rowell, National Track and Field Chairman of the Amateur Athletic Union of Canada was most helpful with his ideas on the development of a Constructive Public Relations Programme.

ADMINISTRATION OF TRACK AND FIELD ATHLETIC MEETS

Administration is defined as "the performance of the exeeutive duties of an institution, business or the like", and in the case of Track and Field Athletics Administration involves the management and direction of a Meet. In a large spectacle such as the British Empire or Olympic Games, the organization is very complex, and the administrative duties are delegated to key personnel who compose the Meet Executive Committee.

From the experience gained in organizing the Track and Field events at the 1954 British Empire and Commonwealth Games in Vancouver, we are of the opinion that regardless of the size of the meet, the same basic outline is applicable, with certain necessary modifications. The problems which one meets in the large event, are equally as important in the small. We cannot over-emphasize attention to detail, because of the number and complexity of events.

It is our intention here to outline the organization of a large meet, from which you may select the material applicable to your own situation. The following chart presents in graphic form, the various committees and their lines of authority:

(A) Games Organization Committee

In preliminary planning of any event it is necessary to set up a small Meet Executive Committee, composed of possibly 4 - 6 individuals who are experienced in meet organization, and who will probably assume important roles later in the conduct of the Meet. This committee will get together several weeks in advance to lay out the organizational framework, and to select an Administrative Director.

Administrative Director.

The Administrative Director is appointed or elected, and as chairman of the Meet Executive Committee he is the top man on the organizational chart. He assumes the greatest responsibility for the running of the Meet, and performs many executive duties which cannot be delegated to sub-committee chairmen.

(B) Pre-Meet Sub- Committees

As early as possible the Meet Executive Committees should appoint Sub-Committee Chairmen, who will report to the Administrative Director. Once these have been organized and are functioning smoothly, this group should meet periodically as a Games Organization Committee. Following is a suggested list of Sub-Committees with a brief outline of their duties:

(a) Awards

What awards or trophies are being given? Are these on an annual or perpetual basis? Has this item been budgeted for? Has the Committee investigated the possibility of having the trophies donated? What about engraving? Make arrangements to have trophies engraved. Provide a signature book so that trophies may be traced from year to year. Send out letters in advance asking that trophies be returned for display purposes. Arrange with a local department store to have a window display of trophies.

(b) Equipment

The committee should survey the types and quantities of equipment necessary to conduct the meet. It is wise to list the events, and opposite each itemize the pieces of equipment needed. The important thing to remember is that implements being used should be official, according to the International rules. Someone should be assigned to the job of collecting the equipment, and seeing to it that the items will be on hand when they are needed. A sample list of equipment follows:

Starting Blocks
Shells
Guns
Wool (not nylon)
Judges' Stand
Timers' Stand
Relay Batons
Hurdles
Dolly for transporting hurdles
Vaulting Poles
Cross bars
Ladder
High Jump Stands
Pole Vault Stands
Trowels
Putting Shots - Men
Discii
Javelins
Hammers
Stop Watches
Officials Badges
Benches for Contestants
Relay Signal Flags
Wind Gauge
Tape Measures
Field Megaphones
Victory Stand
Lap Bell
Lap Scoring Cards & Numbers
Whistles
Rakes
Hammers
Lifts for Pole Vault
Markers for Weight Events
Shovels
Tables for Recorders
Chairs
Typewriter
Clip Boards
Application for Record Forms
Scoring Forms
P.A. System
Numbers & Safety Pins
Flags
Prize Table
Sector Flags

(c) Events

The Events Committee should decide the type of entry form to be used, the limitations of entries, deadline for closing entries, who will be the Entry Secretary, where entry forms will be circulated. This committee will also decide on point system, will apply for sanction, will prepare a rough draft of form for approval. Later, the committee will collect the entry forms, conduct the seeding of heats, drawing of lanes (if this is being done in advance), preparing lists of competitors' numbers, preparing scoring forms for the various events.

The Events Committee should draw up a time schedule of events, which will be incorporated into the official programme. This scheduling of individual events, with their relation to each other and to the total programme, is a very important aspect of meeting planning. The important thing to remember here is that due consideration must be given to allowing sufficient time for an event, and to allow athletes the opportunity to compete in more than one event. The time schedule should be a reasonable one, and every effort should be made to keep the events running according to schedule.

(d) Facilities

The Committee should examine the facilities carefully, keeping in mind that records cannot be approved unless the track has been properly surveyed as to length and inclination, and the jumping and throwing areas are correct in every way. The following should be noted:

(a) Is the track of standard length and is it level within the tolerances provided by the rules?

(b) Are the throwing and jumping areas located in their most advantageous position, so that several events can be conducted at the same time? Safety is a factor which should be considered.

(c) Have proper circles and take-off boards been provided, and are the runways level within the tolerances provided by the rules?

(d) Are the finishing posts placed in the proper position and clearly marked?

(e) Have the starting and finishing lines, lane markings been carefully measured and marked so that records may be claimed?

(f) Has a warm-up area been designated, and properly roped-off?

(g) Survey certificate

Where possible obtain a signed certificate, stating the condition and composition of the track, and certifying its exact length.

(h) Dressing Rooms

The committee should see that adequate dressing room accommodation is provided, including hot showers and rubbing tables.

(e) Finance

The Committee should decide on the budget needed to stage the meet, and someone put in charge of it. The budget is usually itemized under headings such as Printing, Advertising, Equipment, Prizes, Billeting, Refreshments, etc. This budget could form the basis for discussion if a sponsor is being sought. The person in charge is either allowed to open a trust account with funds supplied up to the amount of the budget, or he is allowed to charge items to the Association or Club, within the limits of the budget.

If feasible, the ticket sale may also be handled by this same person, who then submits a complete financial statement to the Committee.

The Committee should appoint someone to obtain suitable personnel to man the enclosure, to sell and take tickets. The number will depend upon the type of park and the numer of gates. Rolls of strip tickets, change and Ticket Clerk's report form should be provided. Signs should be posted listing the ticket prices.

Athletes and officials should be mailed their passes prior to the event, if possible. Otherwise it is a good idea to issue the tickets at a table outside the enclosure, when the athletes report for their numbers, and the officials report for their badges.

It is the duty of the official in charge of this sub-committee to secure ushers, if reserved seat tickets are being sold.

At the conclusion of the meet the official submits the signed ticket report and proceeds to the Committee. Sample ticket report is attached.

The advance ticket sale is another problem which must be decided upon --- finding available outlets, such as your own membership and possibly a downtown sporting goods store.

(f) Housing

If athletes are to be housed and fed prior to and during the meet, someone should make the necessary arrangements. In some cases this is done by placing them in private homes, at no cost to the organization, or they may have to be given hotel accommodation. It may be the policy of the organization not to accept any responsibility for billeting, although bookings might be made on behalf of the visiting athletes.

(g) Invitations

The Committee must decide on a list of dignitaries who will be invited, such as the Mayor, a Member of Parliament, top A. A. U. officials, Club Executive, etc. One of these might be asked to officially open the meet, and someone else to make the award presentations.

A letter should be sent to all those on the complimentary list, inviting them to attend, and enclosing a pair of complimentary tickets. In some instances a special platform, or area in the stands is set aside for the complimentary group.

(h) Officials

This is one of the most important Sub-Committees of the entire planning for a Track and Field Meet. It may involve the recruiting and training of a large number of individuals, such as was necessary for the British Empire Games. However, if the meet is not a large one, the problem resolves itself into one of inviting persons to officiate who have had experience. In this latter event, the committee would send out a letter or card, outlining the details of the meet and asking if the individual is willing to serve in a particular or general capacity. Then, on the basis of replies received, the official list is made up.

Officials training for the Games started two years in advance, and several clinics were held at which rules were studied fully, duties were discussed, and many practice sessions conducted. From this group, after careful consideration, the key Games officials were selected.

The duties of officials will be discussed later under Meet Management.

(i) Publicity-Programme

The Committee decides how much is to be spent in advance publicity, press luncheons and advertising. They would be wise to invite the press to some of the early meetings, so that the meet could receive advance publicity, such as type of meet, who is sponsoring it, how many entries are expected, where it will be held and when, names of some of the outstanding athletes expected, etc. Displaying trophies in windows - distributing placards - radio publicity, illuminated signs, etc. press releases.

Programme

The Committee decides whether or not it is feasible to have a printed programme, and it discusses the type. Should a sponsor be sought who would bear the cost of printing? Should a number of advertisors be solicited? Should the programme be sold, and for how much?

(j) Transportation

This sub-committee is in charge of the transportation, which involves meeting visiting athletes at boats, trains or planes, transporting athletes to training facilities, or in meeting invited dignitaries. Its importance will depend on the size and type of meet.

(C) Meet Manager

As the name implies the Meet Manager directs the actual track and field programme, consults with and advises the key officials working on the various events, and directs the activities of all the Administrative sub-committees which function during the meet. This means that for the duration of the meet the Meet Manager takes complete charge of the events being contested.

In a large meet the Manager may well have one or two assistants, who share with him the many responsibilities.

(D) Meet Administrative Committees

The actual track and field programme is divided into two parts. One is the Administrative, and the second is the Technical. This division was made for sake of convenience, and seemed to be a natural division for responsibility. The duties of each are outlined as follows:

(a) Announcing

The selection of a good announcer should be given careful consideration, as this person can be the

key to the success or failure of a meet. An announcer who talks too much, or at the wrong time can create a very bad impression indeed. He should be familiar with track and field events, and he should be able to survey the field and avoid making announcements just when an athlete is about to vault or throw. He should be provided with a list of records in advance of the meet, as well as background material on the outstanding personalities taking part. He will then be in a position to organize his job, and be ready to fill in blank spots on the programme.

Besides announcing the start of an event, giving progress reports, and final results, he should announce the Victory ceremony. This will be discussed later. The announcer should avoid paging officials and athletes over the P.A. System, and he should not call an event more than once - and then at a specified time before it is scheduled to begin.

At large meets it would be wise to have an assistant announcer who could relieve the regular one, and who could act as a spotter.

(b) Ceremonial

If a Victory Ceremony is to be given it should take place as soon as an event is completed. This is a difficult procedure at the best of times, as athletes are inclined to wander off after their events. The Ceremonial Chairman will need at least three boy scouts, or other assistance, who will be responsible to escort the victors to the rostrum. They are then detained there until the announcer has the final results, and has signalled in some manner or other that he is ready to start the Ceremony. The dignitary is summoned, the medals readied, and the ceremony may begin, possibly preceded by fan-fare over the P.A. Events on the track are suspended while the Ceremony is taking place, and all attention is focused on the Victory Stand.

(c) Communications

Very few organizations could afford to use the elaborate communication system which we employed during the Games. This consisted of several walkie-talkies carried by individuals placed in strategic positions on the field, and of telephone system from many key points to the Meet Manager's booth. This telephone system also enabled personnel in charge of Dressing Rooms, Ceremonial, Band, Score Board, Recording Table and Announcer to communicate with each other. Conferences were set up by a central switchboard operator, so that any number of phones could be co-ordinated as in the Victory Ceremony.

For most meets, however, communication is handled through the use of boy scouts, and messages are transmitted in that way. At the Games, scouts were used to carry result forms and messages from the event to the recording table, and for other similar purposes.

If it is feasible, it is suggested that one field telephone be installed, from the recording table to the Announcer's booth.

(d) Equipment - Grounds

It is important that equipment be made available when it is needed. This can be done from a central area on the edge of the field, or under the stands. The equipment is signed out and returned at the end of the meet. A sample list of equipment was included in an earlier section. This should be checked carefully by the person in charge, and the distribution should be carefully controlled.

The Grounds-man is usually someone permanently in charge of a particular field, and his services are invaluable to the group putting on the Meet. He will usually look after the lining of the track, the preparation of jumping and throwing areas, and will be on hand to assist with setting hurdles, etc. He should be given a crew of helpers who will set hurdles, carry equipment, and do minor jobs of this nature.

(e) Medical

Where possible a qualified M.D. should be sought, who would be willing to volunteer his services, for the duration of the Meet. His duty would be to deal with all athletic injuries.

If there is a branch of the St. John's Ambulance available, it is suggested that they be asked to attend, and it would be their duty to administer first aid to any spectators. They could assist the doctor if he so wished, but the division of responsibility should be made clear to them.

A first aid kit and stretcher should be provided, and also a section of the dressing room space set aside for the Medical group.

(f) Press Liaison

Someone should be assigned to this important task. His job would be to supply the press and radio with copy material and photographs in advance of the meet, to see that they receive an ample supply of complimentary tickets, and to provide working space for the press during the meet. Upon request he could escort athletes to press and radio for interviews. The important thing is that all available sources of publicity should be given ample opportunity to assist in the promotion of the event.

(g) Recording

The Recording Staff may consist of from 2 to 6 persons depending on the size of the Meet. Their main duty at the meet is first of all to issue competitor's numbers and officials ribbons, then to receive and tabulate results.

At the Empire Games the recording tables were located at the edge of the grandstand, on the same side of the field as the announcing booth. A teletype machine was employed, so that results were typed, checked and then teletyped, to be received instantaneously by the announcing booth, as well as other outlets on the round robin circuit. Normally, results are checked and the score sheets forwarded to the Announcer, and then returned to the Recorder.

The Recorders also tabulate the results to secure individual and team winners, and they work with the Records Committee in checking local or other records.

This is the nerve-centre of the meet, and performs a most important function.

(h) Records

It is most important that "Application for Record" forms be completed before athletes or officials leave the ground.

Some individual should be designated to work at the recording table, to prepare forms for signature, and obtain the signatures of all those concerned with the event. Failure to do this will result in an almost impossible situation, that of obtaining the data afterwards.

(i) Technical Consultant

Most groups are not fortunate enough to have, as we did at the Games, the services of a Technical Consultant. A professional engineer, he was invaluable both before and during the Games, when he checked and certified the equipment, checked the track and field facilitities, and supervised the surveying and lining out of the track. We could recommend that such a person be obtained for large meets.

(E) Meet Technical Committee

The various technical duties are given in the International Track and Field Rules Book, and time does not permit giving a detailed explanation of them here.

We are suggesting that a Referee be placed in charge of each of the three main divisions--Track-Jumps - Throws. The various positions are as follows:

(a) Referee - Track Events

I. Clerks of Course
II. Lap Scorers
III. Marshalls
IV. Starters
V. Timekeepers
VI. Track Judges
VII. Track Umpires (Inspectors)
VIII. Wind Gauge Operators

(b) Referee - Jumping Events

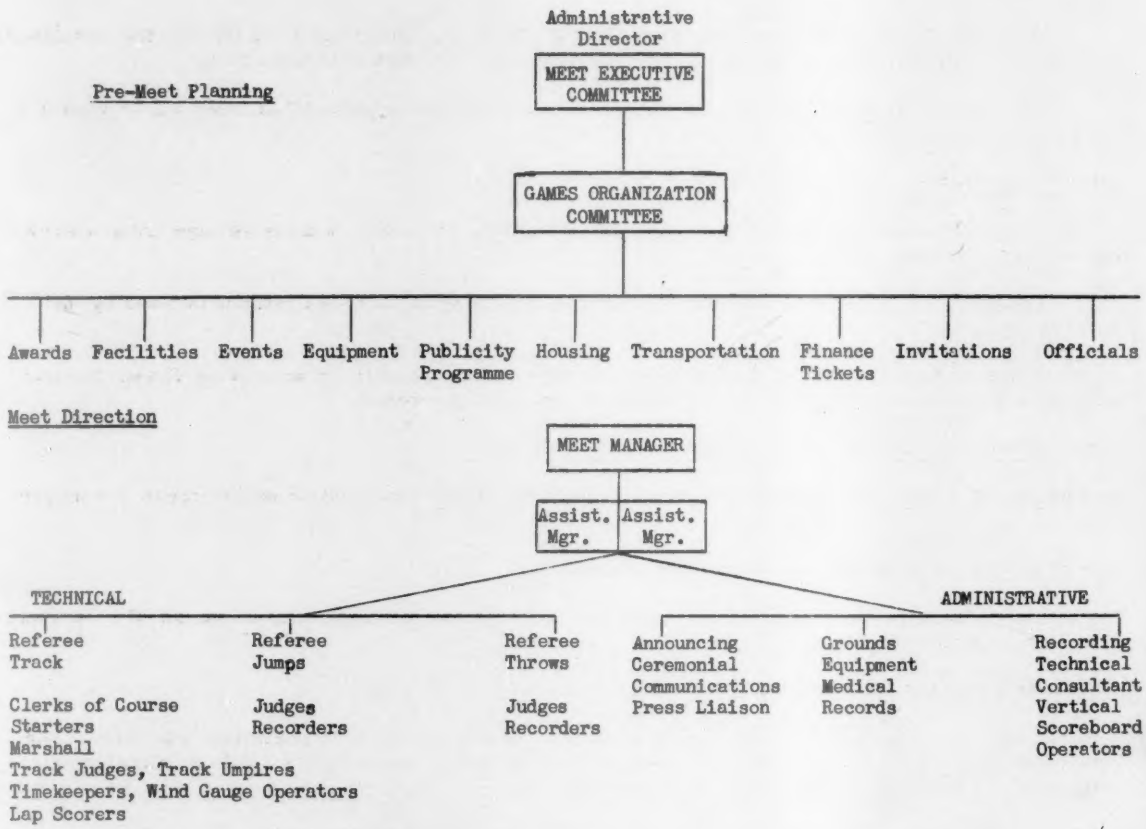
I. Judges
II. Recorders

(c) Referee - Throwing Events

I. Judges
II. Recorders

(F) Final Report

At the conclusion of a Meet it is desirable that the completed results be tabulated, and circulated to the clubs taking part. Also, a final report should be prepared and submitted to the Organization, giving a report of the meet, financial and general, and containing suggestions, criticisms for planning of future meets.



DEVELOPMENT OF A CONSTRUCTIVE TRACK AND FIELD PUBLIC RELATIONS PROGRAMME.

The success of sound public relations depends on enthusiasm, energy and an intelligent approach to each and every problem. Develop friendly relations with the press. Constantly strive to understand the position of newspapermen and assist them in every way possible.

All organizations participating in track and field must function smoothly, efficiently and honestly. It is wise to do this so that it will attract the youth of all nations into participation.

Emphasis should also be placed on students graduating from schools as this is a critical period of life. Organizations should be attractive enough so that athletes will continue to compete.

Glamorize track and field for greater public appeal.

Telephone newsworthy stories that occur in training--e. g. --Fred Rowell being locked out of dressing room one night by watchman at University of British Columbia. This story created helpful amusement in the press the next day.

Attempt to keep the pot boiling the whole year round with tidbits on athletes. Continue a saturation programme. If need be contact local press 5 days a week. Remember it pays off, and a good imagination helps.

Establish Clinics in remote areas as well as larger towns, the greatest strength is the enthusiasm of the smaller communities. If available, take handsome and well known athletes along.

With greater recognition on press, radio and television, more potential athletes will turn out for track and field.

Track for Everyone.

Mass participation is the key to a physically fit nation, otherwise in the 30-40 age group many are prone to disease from lack of exercise.

The public must be made aware of the benefits of running at all ages if caution is taken by the beginner.

Grade Levels should be instituted for people who wish to compete but are not top flight. Encouragement in this manner helps to publicise the sport and creates goodwill.

Helpful Hints in Promoting either a large or small scale Meet.

Preliminary Planning--decide what size of meet it will be, do not change plans at last minute for larger meet.

Most Important--Co-operation of all parties concerned.

Press Party--Invite press, radio and television to conclave prior to meet, explain in detail the aims and hopes of this promotion.

Attempt at all costs to be fair to all parties concerned in news stories.

Social Events should not be overlooked and a social function of the women's committee will receive publicity on the social page. A large Annual event such as "The Vancouver Relays" with municipal co-operation could receive a proclamation known as "Relays Week".

Local Appearance of guest Athletic Star at charitable events stimulates and capitalizes on the personality of the athletes concerned. A Queen for a major meet would create additional interest other than athletic.

Send weekly or daily Bulletins well in advance of meet, saturation helps to overpower those who are luke warm to a track meet. The Publicity Director should be free for one week prior to the meet if he is to get maximum results.

Teams participating should send "Wire Releases" prior to departure for meet. A concerted effort assists immeasurably the success of the meet.

Need to establish co-operation of all coaches concerned in sending photographs well in advance of meet.

Photographs should not be sent unless clear. Many are rejected by newspapers due to poor photography.

A colourful Souvenir Programme of the previous year will help secure new entries. Send each organization one with the first bulletin.

Meet Director should not be announcer at small meet, needs to be left free for meeting V. I. P.'s and honoured guests. This is not only more efficient but easier on the nerves after a harrowing week. If meet is efficiently organized, Meet Director should be in a position to leave on a fishing trip the night before.

Newspapers like to orient an athlete with a great star. This has been my experience in promoting both major and minor spectacles.

Arrange for an outstanding track celebrity to be on hand several days prior to meet. Good publicity can occur if track man a golf fan. Example-- Have him play with the best and most popular golfer at one of the exclusive clubs. This once occured and he played in sweat suit and spikes. The newspapers naturally assigned photographers to cover the match.

"Helen Stewart Story"- Pan American 100 metres swimming champion. Four days prior to the Vancouver Relays she decided to run in the womens 100 yards. An evening announcement brought large stories next day. The following day one of the papers ran a 3/4 page picture of her as she was also the athlete of the year. This gimmick was the shot in the arm required for giving life at the right time. Ideas such as these need to be created with perfect timing. Once the spectators are at the meet the most important factor is holding to a definite time schedule and good Meet Administration.

The long hours promoting Track and Field is worth the effort, for it creates democracy and equality among mankind. New friendships are formed and international good will created. This offsets the minor frictions between nations and eventually will lead to understanding among all peoples.

SPRINTING

By Oliver Jackson
Abilene Christian College

In presenting this discussion on the sprints, I will attempt to point out a few of the things that we do at our school. All of us, I am sure, agree that sprinting is a strength exercise in the sense that it obviously requires more force - more strength of muscle than is needed to run slowly. Sprinting ability will determine how much success you have in track events. We are beginning to realize more and more every day the importance of speed. The football coaches are looking for more speed, the basketball coaches, baseball coaches, and track coaches are all in accord that you must have speed in order to win consistently.

Regardless of what some of our Psychology Professors think, I still believe that speed is inherited. Sure, you can improve anyone's speed by work and teaching him better form, but his actual speed was present before you ever worked with him. I think that this fact is proved in that practically all of your great sprinters have been men that had good times recorded while in high school. They were considered to be fast when they were in the first grade, fourth grade, or eighth grade, even before they had any coaching. With these thoughts in mind, let us consider the starting procedure that we use in the sprints.

THE START

We take our starts in the middle of our workout because then the muscles are sufficiently warm and ready for reflex action, yet they are not tired. I do not believe that it is necessary to take starts five days a week, as some do. Too many practice starts tend to decrease the spring in your legs as well as cause you to form bad habits.

You need to experiment a great deal in order to find the best position for a sprinter on the blocks. We used to think that it was essential for a short, stocky sprinter to use the "bunch" start and for the tall sprinter to use the "elongated" start. Today I believe you will find that sprinters are going more to a balanced start rather than the two extremes.

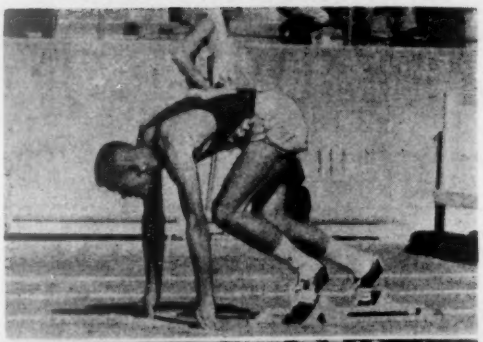
In teaching a boy to start, if we will place his front block at the usual position of 16 to 21 inches from the starting line and then extend the back block as far back as it will slide along the base. Have the sprinter come up in a "get-set" position with his hips slightly higher than his shoulders. Have enough forward lean that his shoulders are about four inches ahead of the hands. With the sprinter in this position, you can check his back leg to see if he feels that he has power in the leg or if it is limp. Continue to slide the back block forward, while the man is in that same position until the runner feels that he has maximum power in the back leg. You can see from this description that I believe in fairly equal distribution of power between the front and back legs while in your starting position. I do not like the lifting action of the back leg because it tends to roll the hips under instead of drive them forward.

Even after you find the 'power points' on your blocks, they will probably be changed as the runner experiments with various positions in his workouts. The watch should be used as you get into the season to time the runner on 25 to 30 yard sprints from the various starting positions to find the position best suited for the individual man.

The next point of importance in starting is the use of the arms. As we mentioned previously, harmony must exist between the leg and arm movements in order to have body balance, maximum power, and relaxation. We use motion pictures to demonstrate to our sprinters how terrible their arm action is. You will find in the study of film that most beginning sprinters, as well as many experienced runners, tend to "run through the hoop" formed by their arms. By that expression I am trying to describe the "dead" position of the arms in contrast to the vigorous, driving action which they should use. They actually form a hoop with their arms, and their feet practically step through the hoop before arm action is begun. Arm action must be coordinated with leg action and should begin with a forward thrust of the left arm as the right leg (back leg) starts its drive against the block.

The third principle in starting is to have the head in position to guide the body down the track. If you maintain too low a position of the head, it will cause you to stumble, while if the head is too high and you try to look too far down the track, it causes you to straighten up prematurely, thus losing much of your power and drive, which is so essential during the first 20 yards of the race.

1956 OLYMPIC SPRINT CHAMPION BOBBY MORROW



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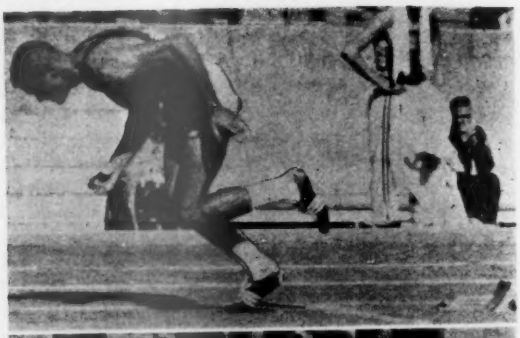

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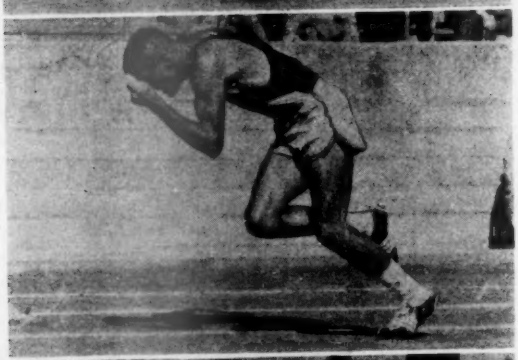

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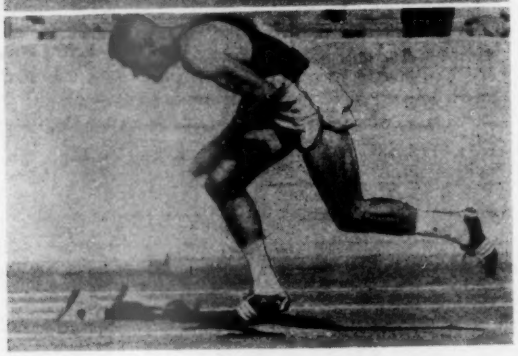


The position of the head in the "get-set" position should be such that the neck is in line with the body and the eyes are looking only three or four yards down the track. This position will prevent the muscle strain and tension around the shoulders, arms, and upper body. Do not allow the runner to start looking for the finish string as soon as he leaves the blocks. This lifting of the head should come gradually with the lifting of the entire body to the running position, which is accomplished at approximately the 25 yard line.

THE STRIDE

I think that the most essential factor in sprinting success is the ability to relax. In fact, I have yet to see a great track and field performer who could not relax and make it look easy as he was setting the records. The only way that I know how to teach a man to relax in running is to have him run a lot of 2/3 and 3/4 speed work. You must continue to talk to him, even holler at him, during his workouts to impress upon him the importance of relaxation. During the fall months, I like to use over-distance work not only to condition and strengthen the body but to prove to the boy the advantages of relaxing.

At Abilene Christian, we very seldom have the sprinters run with the watch. About the only time the watch is used is when we are trying to perfect the first 50 yards of the race. I think that by using the watch on short speed work, you can prove to your sprinter that he can make better time by correcting his stance, lean, arm action, higher hip position or lower hip position, as the case may be, while coming off the blocks. We also use the watch some in early season when we are running 300's with our sprinters. We always have the sprinter run the 300's at a certain pace, trying to hit a predetermined time, and never do we run "as hard as you can" on this over-distance work.

We like to use the old term "in and outs" to describe the type of work that our sprinters do to learn relaxed running. Relaxed running can be accomplished only when there is harmony between the leg movement and that of the body, which is controlled to a great extent by arm action.

In the 100 yard dash, the runner must be able to maintain a forward lean of the body to the extent that he can drive with his feet behind him and still not be off balance. As you move into the longer sprint races such as the 220, 300 and even 440, the feet are more under the body, the body lean is not so pronounced, and the driving action of the legs decreases to some extent. During the body of the race, sometimes referred to as the stride, the arms seem to get lost and the result is that novice sprinters lose much of their energy and power in trying to control this poor coordination. Sprinters should work toward gaining a perfect rhythm between the arm and the opposite leg.

THE FINISH

The finish of the race is improved greatly through experience. The experienced runner is able to maintain position in the race with a relaxed stride during the body of the race, and as a result he saves power and energy for a driving rush at the tape. This drive should always continue until a few yards beyond the finish line. Do not leave the ground in order to break the tape. You gain speed while on the ground and not while in the air.

You will not only have a better chance to win, but you may protect yourself from injury by "running through" the tape rather than jumping for it. Many sprinters have been injured as they pass or just after they pass the finish due to the fact they were off balance in their attempt to drive at the tape.

WORKOUT PROGRAM

We believe in calisthenics for our sprinters, but we do not allow them to take too much of the extreme stretching exercises such as the hurdle exercise. Contrary to the belief of many coaches and trainers, I feel that too much stretching, especially on heavy, short muscled boys, tends to lead to knotting of muscles and eventually muscle pulls.

Our training routine during mid-season for our sprinters runs something like this:

Monday: Fifteen minutes of jogging on the grass. Fifteen minutes of calisthenics. Three repeats on in and out 220's on the straightaway. Form work on the blocks, but never at full speed. Finish with a 220 on the curve at 3/4 effort.

Tuesday: Fifteen minutes of jogging on the grass. Fifteen minutes of calisthenics. Five to six 75's on the grass at 3/4 to 7/8 speed. Take ten to twelve starts with the gun. Handle baton on sprint relay exchanges for 15 minutes. Finish with a 150 at 7/8 speed.

Wednesday: Fifteen minutes of jogging on grass. Fifteen minutes of calisthenics. Two laps around the track doing in and out 110's. Five or six starts with the gun. Two 50 yard sprints at near top speed. Handle the baton on relay exchanges for 15 to 20 minutes, taking two or three at top speed. Finish with easy strides on the grass.

Thursday: Fifteen minutes of jogging on grass. Fifteen minutes of calisthenics and easy stretching. Four or five easy starts off blocks concentrating on form. Handle the baton for ten to 15 minutes at 2/3 speed. Finish up with easy jogging on grass.

Friday: Very little other than easy stretching and jogging on grass. We do not like to get on the track at all on Friday. When traveling, we do not work out on Friday except to walk and do some easy stretching.

Saturday: Competition.

THE TRAINING OF JESSE OWENS

By Larry Snyder
Ohio State University

I wish that every track coach could, early in his career, have an athlete like Jesse Owens to work with; it would open up so many avenues that remain undeveloped. Not only did Jesse have all of the inherent qualities of greatness in track and field, but he was eager to learn everything that might help him and as a result was receptive to every coaching hint. He, also, increased the bounds of track possibilities.

When Charlie Riley, his Junior High coach in Cleveland, said, "Put your feet on the track as if you were touching a hot stove", that didn't mean to Jesse that the track was his enemy. It meant that it was an object to be treated with tenderness. He learned to caress the track with the lightest tread I have ever seen. His beautiful timing, his smoothness of every movement while running gave the impression to this observer that he was making all the correct movements of sprinting, but that instead of him moving forward some unseen hand was pulling the track under his feet. His form from the start to finish has never been equalled. He combined the essentials of sprinting to a greater degree than most champions. How many times the question was asked, "How fast could he run if he really tried?"

Now just what are those essentials? First, and extremely important, is the mental or nervous control of the body which enables the sprinter to operate at full speed, with intense determination, with complete awareness of what he is trying to accomplish and still remain relaxed. Tense muscles will not react as swiftly or as efficiently as muscles which are only firm enough to hold form.

Second, the starting position. In 1929 when George Simpson of Ohio State set the N. C. A. A. championship mark of 9. 4 while beating Wykoff, Bracey, Leland, Hutson, Elder and several others, he used starting blocks. Since the International Federation had not approved them, the AAU refused to accept this record. Now, of course, starting blocks are used in all competition. In coaching George I was convinced that he should crowd the starting line instead of placing his front foot 18" back of the line, with the rear knee opposite the arch of his foot. George never gave the crowd-the-line start a chance and as a result, I feel, never was a great starter. He was more tense than Owens while in "set" position and as a result he toed out during his first four strides.

Jesse had no definite starting position when he came to Ohio State. It varied from start to start; nor did he focus on the gun. I am sure that he started when the first of his opponents started whether the gun had fired or not. I watched his eyes to learn this and am convinced that that is the way he timed his start. His reaction time was fast enough so that he never was left at the starting line.

I explained to him why I felt that crowding the line would give him an advantage over any boy whose front foot was farther back of the starting line than Jesse's was. The only thing that would stop us from getting the front foot closer and closer to the line would be the feeling of discomfort while "set". And remember this, what may be discomfort or an off balance feeling the first few days such a start is tried, is no cause to discard it. Practice in such a position with the front foot 10" to 14" from the back edge of the starting line and the toe of the back foot one, two, three or four inches back of the heel of the front foot. If he can not feel this position, as Jesse did, move both feet back 1", 2" or more until you arrive at his "best" position.

"Set" position is gained by rocking forward and upward until the hips are slightly higher than the shoulders. The arms (straight) and like two vertical supports under the shoulders, move slightly ahead so that the leading edge of the shoulder is over the forward edge of the starting line. The hands are bridged with the thumbs and forefingers along the back edge of the starting line. The eyes may be looking downward or slightly down the track... but not far enough to cause neck strain.

The back should be flat--not rounded or the power-line will be destroyed during the initial drive.

I am convinced that the attention should be on the gun---not on the movements to be made when the gun cracks. No sound or movement should cause the sprinter to start except the crack of the gun. We practice this by giving a command such as this instead of firing the gun: "Rock back to your marks." If the sprinter is not tense, and if he is focused on the gun he will not jump--he will rock back easily to his first position on the blocks. Jesse learned this quickly and never forgot it. I can not recall any occasion,

when the starter was competent, that he ever failed to go with the gun. Do not spring from the mark--run out of the "set" position.

The third essential to good sprinting is acceleration. Ohio State sprinters are all taught to reach out normally (no chop down) with the back foot; nor are they encouraged to drive off the back foot. There will be a reaction against the back block, but I believe that the sprinter need not think of that. The lead foot will do the driving. He should drive his left arm forward and upward (swinging upper-cut) as the right foot moves out; his right arm hooks, and is driven backward with elbow leading until the shoulder-yoke stops the backward action. There is plenty of time to take full arm swings and full leg reach (not over-reach), while the left (forward) foot and leg are driving the body forward. The knees are relaxed so that tension does not turn the toes outward, nor pull the whole foot laterally. The foot should hit (1st stride) directly ahead of the back block and at least 24" ahead of the back edge of the starting line. Succeeding strides should also be straight ahead and each stride longer by 3 to 6 inches than the preceding one until the runner is in full stride. First stride is measured from starting line to first toe imprint. The power line--heel to the back of the head--is a gradually rising diagonal line (at the time foot leaves the ground) until the sprinter has gained his normal running angle. This angle is, I believe, predetermined for each sprinter, by his physical structure; slight alterations are sometimes successful. I'm sure in Jesse's case his 1936 body angle was slightly more forward than in 1935. Too drastic efforts to change body angle may result in pulled ham-string muscles.

Now to the fourth essential; sprinting action through the body of the race and through the finish tape.

Body angle has been mentioned. Foot placement in the hot stove manner--as lightly as possible--land high on the toes, rock down on foot to get good ankle flexion but not so low that the heel touches the track. Arms swing freely, with near 90 degree angle between upper and lower arm; inside of arms are close to body as they swing past it, with elbows riding high in the rear and moving out laterally as they pass body on rearward swing. Hands should be closed lightly--not clenched--and moving forward and inward so that the right hand is just below the right eye at the highest point (left below left).

The arm swing described above can only be attained if the sprinter allows his knees to have free action. They must be relaxed so that the knees come up high (without altering body-angle by leaning back) and the lower leg swings forward, but the foot does not touch the track until the foot is swinging back toward the runner. Tension is the sprinter's greatest enemy.

Training a sprinter so that he can run relaxed the whole distance must be preceded by a convincing talk to the boy that he will run faster and sprint faster if he follows your advice. Instead of tying-up at the end of the race he will be running his fastest. Think--form, form, form not--fight, fight, fight.

Starts, of course, must be taken daily with or without the gun. Jesse started hundreds of times from any part of the track. I have always recommended that a sprinter does not need a starting line or blocks to practice starts. Have him stop on the track or the grass during workouts and take an easy start. Make sure that he holds his "set" position at least two seconds when practicing alone. Do not let him move from "on the marks" to running without a full concentrating period--while he thinks what he is about to do. Such starts day after day make it possible for him to focus only on the gun when he practices from the regular starting line. Have him start with one foot on each edge of a lane line--he can check his foot-prints for direction and lateral movement.

A gun start for Jesse was a 50-yard dash. He never ran less than that and what was equally important he never put on the brakes. He coasted another sixty to seventy yards in the same lane until he stopped.

In my opinion the sprint type runner can run a fine 440 yards on a relay team without ever running hard that far in practice. Jesse's longest practice distance for time was 300 yards (he ran 29.5 many times) yet he could and did run a very acceptable 440 on the one occasion we needed him on a relay team. Because of his great efforts on the weekends, three and four events, we did not work too hard in practice. He took easy starts, strode with the quarter milers, high jumped--which he loved to do. He could have done 6'6" without too much training on his lay-out. He had abundant spring, but with Albritton and Walker jumping 6'6" to 6'10" there was no need to press Jesse.

He enjoyed doing pop-ups from the broad jump board but not more that two or three times during a season did we combine speed and all-out broad jumping in practice. Pops, yes, a lot of them to develop leg kick in the air and full leg extension in landing. Speed runs to check the stride on the take-off. Little, very little, hard jumping.

Jesse ran a lot of 75 yard dashes and on other days 180 yards--three, four or five of them. On the day a 300 was to be run it followed gun starts--then easy striding. He ran many laps as all runners do, unsupervised, just for the fun of it. Toward the end of the season workouts were lighter as the meets became bigger and tougher.

The day Jesse broke three and tied another world mark in 1935 was one of those burgeoning spring days that loosened muscles and gave the verve and spring to his every movement. He did spend several hours in a hot tub that morning to help mend an aching back--it helped, I'm sure--yet it was the awakening of spring which did more. And, of course, there was really a choice bundle of nerves, muscles, bones, sinews and brain to awaken. Jesse combined the ability to relax with all the other God-given qualities of a great sprinter and astonished the whole world with the greatest performance to date.

At Berlin the weather was cool-wet, cool-windy and just plain cool, but there again he was superb. Perhaps he had eternal spring in his make-up and did not need to draw on any outside aids.

Since we have covered the main points of sprinting it might be interesting to relate a few incidents which stand out in Jesse Owens' eventful two years of competition at Ohio State. As a sophomore and junior at Ohio State he won four outdoor championships in the Western Conference Championships and four in the NCAA meet in both 1935 and 1936. He was defeated only once in a championship meet--at Lincoln in 1935 after eleven false starts--Peacock of Temple won the 100. Peacock also won the broad jump that day. He had only one jump over 26 feet--a 26'3-1/2 effort. Jesse had all jumps over 26', but the longest was 26'3". I have always taken "credit" for those defeats because I told Jesse after his four championships in the NCAA at Berkeley that any competition during the rest of the trip would be taken in stride. "Enjoy yourself," I admonished him, "you have accomplished more than any athlete or coach could have hoped for this year."

At Berkeley, Jesse had won the 100, 220 and Broad jump. His last test was the 220 low hurdles with Glenn Hardin, among others. Glenn was the choice of many coaches because he was a quarter-miler who specialized in the 200 and 400 m. hurdles. He was well coached, loose and a fine competitor, but he was no match for Jesse who went into the lead at the first hurdle and won going away (five or six yards). He did this running into a strong wind by riding a little longer over each hurdle. Jesse's stride was only seven feet long--so he regulated his carriage over the hurdle to fit the conditions. With the wind he could chop down as fast as any low hurdler.

Now an amazing thing happened. Glenn, the Louisiana white boy, and Jesse, the Ohio negro, stood on the victory stand with their arms encircling one another. It was one of Jesse's--and probably Glenn's-greatest victories. It proved conclusively that through athletics the races and the nations could be joined in amicable relationship.

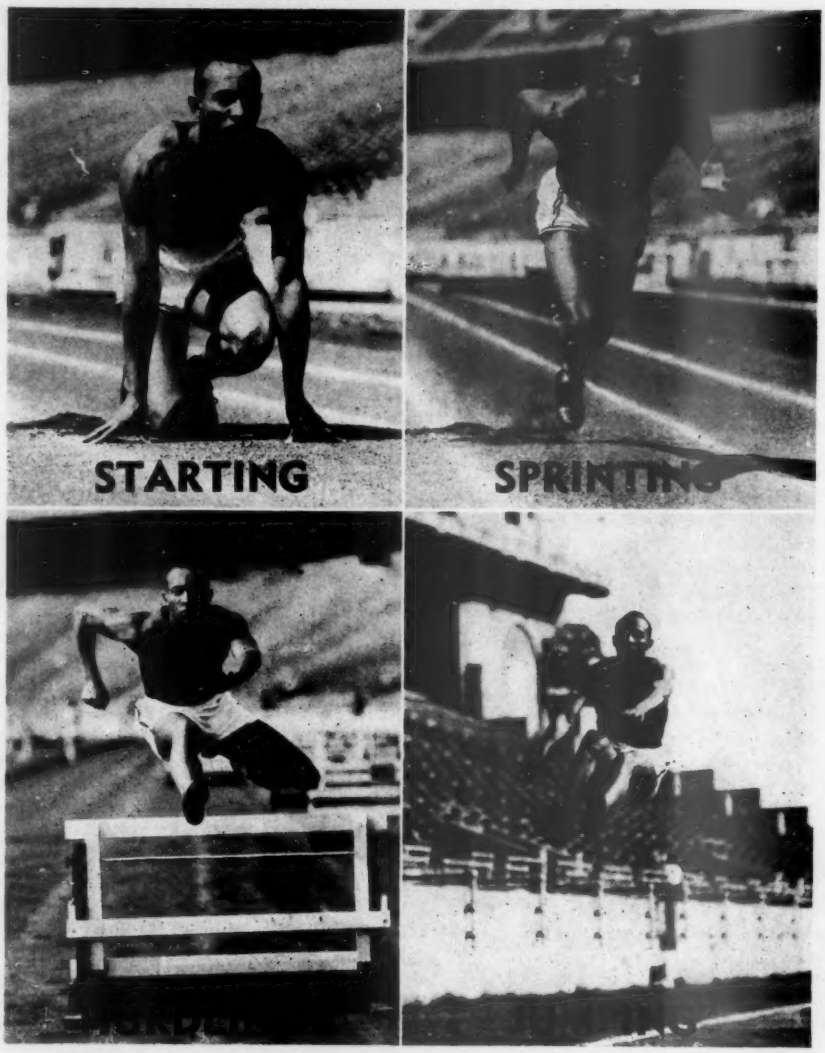
But that was not the end. Jesse on Friday had won the broad jump with a qualifying jump of better than 26 feet--now the Saturday spectators wanted to see him jump. After the brief victory ceremony which followed the low hurdle race--Jesse jogged over to the head of the runway, found his starting point still intact, and with his usual dramatic standing start raced down the runway and leaped 26'1". Superb condition, plus all of his other attributes which included a desire to please this responsive crowd, enabled him to accomplish the phenomenal jump. On or off the track Jesse Owens always did and said the proper thing at the proper time. Twenty years after his great track career ended, he is still in the same pattern.

Was Jesse only a front runner? I will relate one more incident which proved to all who had doubted his abillty to come from the rear in a race that they were wrong. It was in Columbus, the Western Conference Championships of 1936. The race--220 low hurdles on the straight. Jesse had to stretch his normal sprint stride to get to the first hurdle properly. This day he forgot to do so. He reached the first hurdle (20 yards) with his wrong foot, he almost fell as he flew over the obstacle trying to retain his balance. He took off for the next hurdle, was 18" too close and almost went down onto the track. At the 100 yard mark, as the runners came in the gates of the Stadium Jesse was 19 yards behind Osgood of Michigan, a good low hurdler. He was in last place by so many yards that as he kicked off the top half of the 5th hurdle bar with his lead foot the swift flying missle shooting diagonally across the track did not disturb any other hurdler. But, now, Jesse was under way. He raced that last 120 yards over five hurdles with such speed that he caught Osgood over the 10th hurdle and won going away. The time, 23.5, was phenomenal. I firmly believe that Jesse ran the fastest 120 yards ever run--and he did it over five hurdles. Did I mention that he had already won the 100-220 and broad jump before this final effort? Through the years the 8,000 spectators who saw this feat have grown to 40,000 and each one of them like to relate how they saw the greatest effort ever accomplished on an athletic field.

This could go on and on but we can not live in the past. The Morrows, the Golidays, the Bakers and Murchisons are rightly taking over from the old timers like Owens, Metcalf, Tolan, Davis, Simpson and Wykoff. They all set some records to be sure, but they were great because when you assembled all the "good ones" on a given day they won. Winning, not fast time, is the hallmark of a true champion. If a record results that is an extra dividend.

(Editor's Note) During the course of his talk, Mr. Snyder called on Phil Diamond, who had acted as head timer in the famous meet of May 25, 1935. Diamond spoke briefly on the timing methods used at the University of Michigan. All three watches on that day were just a shade over 9.3, a fact which was remarked upon by Mr. Harry Gill, the referee of the meet. Diamond stressed the fact that the timing at Michigan is traditionally conservative and that it was his opinion that no one has ever run 100 yards faster than Owens did on that day. There was some further discussion about timing before Mr. Snyder resumed his talk.

Jesse Owens . . . All-Time Perfectionist



HIGH HURDLES

By Francis Cretzmeyer
State University of Iowa

It is a privilege to be invited to talk to a group like this one. There are many fine hurdle coaches and great former hurdlers here who could do a better job. I don't believe we have any particularly new ideas at Iowa; we have just been lucky in having some fine hurdle prospects on our squads. When an occasion like that arises then you are a hurdle coach.

All of our hurdlers since I have been at Iowa have been fairly tall, long-legged boys with only 2 exceptions. Leg length is the thing I like to see in a hurdler - he can get over the hurdle faster due to the fact he doesn't have to cover as much distance in hurdle clearance. However, whether long-legged or short-legged the hurdler should run high at the hurdle - by that I mean he should be up in regular sprinting stride. We have had some trouble with Les Stevens, our number one hurdler this year. He has a tendency to run in a low position or a squat as I call it between hurdles and consequently has to jump at the hurdle rather than step over it. We reminded him constantly of it and I believe it has helped - but we do have to remind him. The man should have the feeling of stepping over the highs rather than jumping them.

In your hurdle clearance the take off foot should be pointed straight ahead. Emphasize this a great deal in practice. The heel may touch the track lightly but the hurdler must drive up on his toes - this helps him to run high at the hurdle as I mentioned before - it will raise his body 2 or 3 inches. As he drives up on his toes we want him to dive at the hurdle. I feel the type of arm thrust used is an individual proposition although I do feel the double arm thrust helps in the dive and in good body position over the hurdle. We have found it has helped some of our boys in getting a better body dip over the hurdle.

As the hurdler drives into the hurdle, the lead leg is brought up in a semi-flexed position, with the knee leading and the lower leg relaxed. I like to see our hurdlers use a bent knee over the hurdles - it helps a great deal in the cut down. Another of our good hurdlers, Jack Mathews, who is out of action now with a pulled muscle has been a problem as far as the last few remarks are concerned. He swings his lead leg up stiff in a circular motion and consequently gets off line as he comes down off the hurdle. We have tried running down a lane line, emphasizing leading with the knee, etc., but it doesn't seem to get anywhere. Finally this year we stopped talking about these faults because we were getting nowhere trying to correct them and I believe sometimes the boy gets so conscious of it, that rather than helping, it may hinder him. Someone may have some ideas both on correcting his fault and also on the idea of shall we say, over-coaching.

As the body is over the hurdle we want good forward lean, a semi-flexed knee, eyes on the top of the hurdle from the time of the take off until the leading knee is starting over the hurdle. Stevens has worked on ducking his head as he is over the hurdle and it has helped him, I am sure.

Don't hurry the trail leg - pull it through flat over the hurdle and carry it through flat. By this I mean don't over-emphasize the action until the knee is pulled forward and up - this has a tendency to straighten the hurdler up and put him a bad position as his lead leg contacts the ground. We like to have the lead leg coming back in a pawing motion so that the body is almost directly over the foot as it contacts the ground thus putting the hurdler in position to continue his spring toward the next barrier.

The action of the arms in hurdle clearance is another problem we have. Whatever type of arm action is used, the main thing is to keep the shoulders parallel - not pull the lead arm back so vigorously that it throws the shoulders out of alignment. We see different types of action with the lead arm but the good hurdlers keep their shoulders lined up. When a boy is having trouble with this we try to get him to break his arm at the elbow as he pulls it back. This simple exercise, exaggerated somewhat undoubtedly, has helped convince some of our boys that this is the thing to do.

The action between hurdles is a regular sprint action with emphasis on good sprinting form.

Relaxation and balance are of utmost importance as well as an effort to have the length of each stride approximately the same. The same sprinting techniques are found in the finish. At least once a week we like to use a finish yarn and have the boys drive for it after clearing the last practice hurdle. We feel by doing this we get away from a tendency to let down momentarily after getting over that last hurdle.

DILLARD

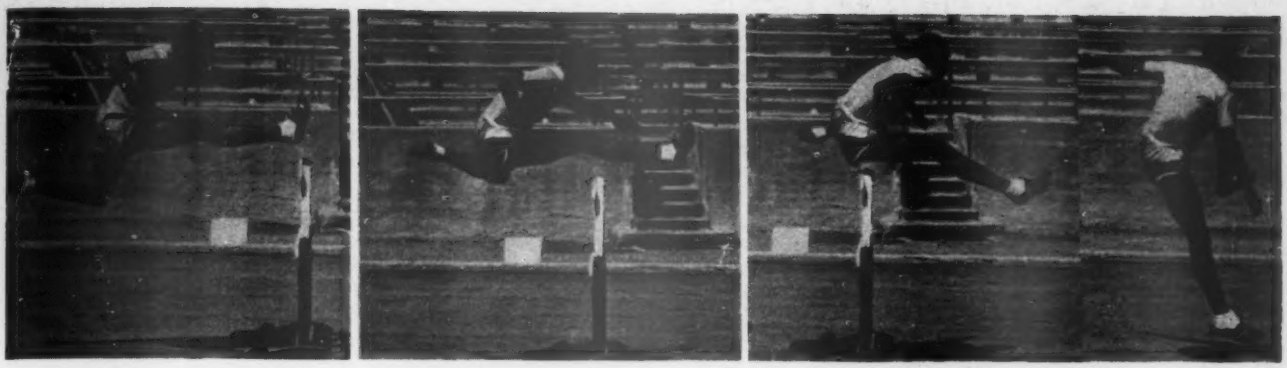
Three rather distinct clearance styles are depicted in these sequences—Dillard, the jump style; Duff, the jump step style; and Finley, the step style. Attention is called to the outward twisting of the take-off foot in the first picture of each series. The purpose of this is to shift the body weight to a position that will permit a balanced landing. Note the pronounced break at the waist of Duff and Finley as they start to leave the ground, in direct contrast with Dillard's too erect carriage,

DUFF

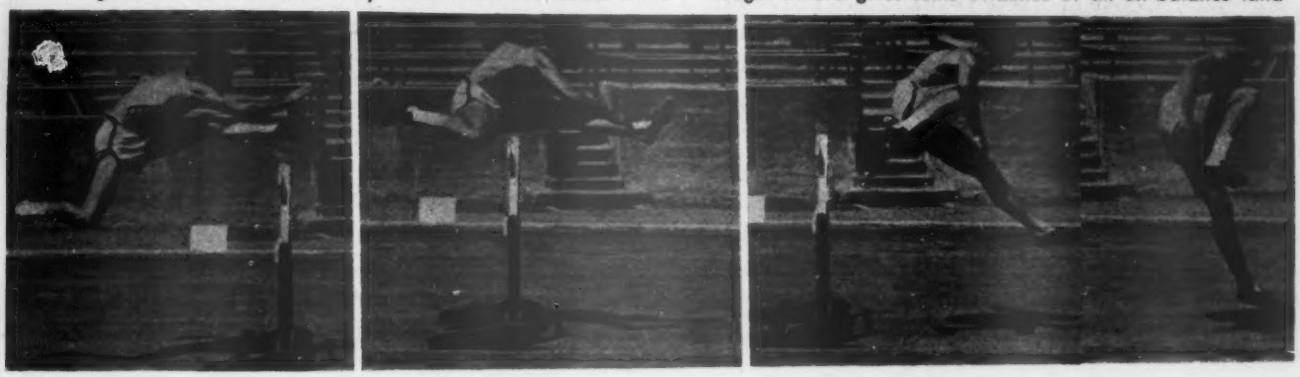
ing and has permitted his arm to fall back too far. Finley and Duff land well-balanced, with Finley, because of his short flight and minimum upward lift, in an ideal position to go into his next step. Dillard, in the last picture, displays that characteristic snap-through of his trailing leg where his knee seems to cling to his chest. This apparently permits him to get the trailing leg down faster in order to go into his next stride. Picture 3 of Finley underlines one of the advan-

FINLEY

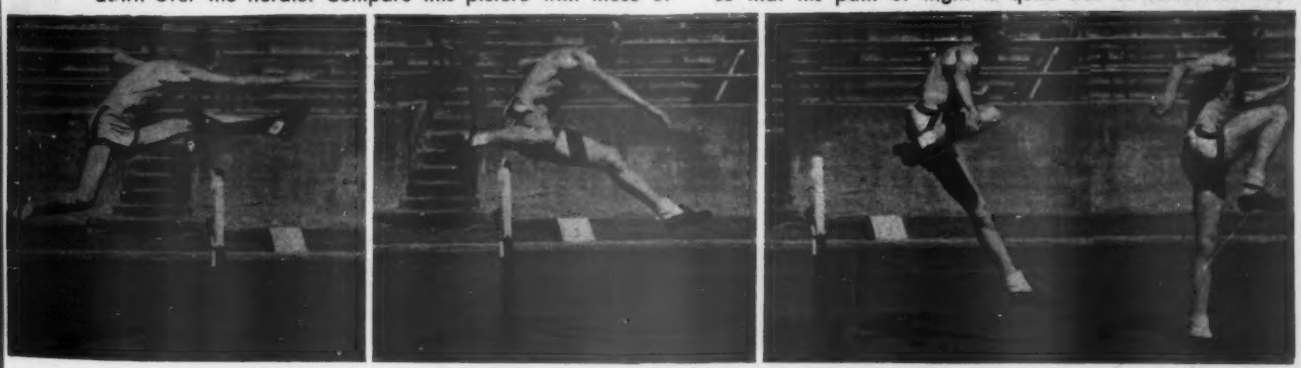
exemplifies the median type of clearance, minimal up-and-down clearance commensurate with his height (achieved with good flexibility and a pronounced tuck), and a flight path not significantly longer than Finley's but proportionate to the drive of his takeoff and the necessity of riding his flight and landing to get into position for the next step. The ideal hurdler would seem to combine the stretch and quick clearance of Finley with the Duff layout and Dillard recovery



which is more characteristic of a broad-jump takeoff. Next note the vigorous forward upward (not upward forward) drive of the lead leg of all the men. This adds to the velocity of their takeoff and prevents their clearing too high. The gather or tuck of Duff's body as he clears the hurdle is the epitome of form. Seldom does one observe such a beautifully balanced and poised clearance. The excellence of the arm action is also worth noting. Duff's arm action is excellent, whereas Finley apparently threw his arm too high in the lunge. Dillard gives some evidence of an off-balance land-



tages of height in hurdling. Despite the fact that all three hurdlers leave the ground at relatively the same distance before the hurdle, Finley, before his foot is more than 12 inches off the ground, has his heel almost ready to start down over the hurdle. Compare this picture with those of Dillard and Duff who are still rising to the hurdle clearance. From tracings of the path of flight of these hurdlers, it is evident that Finley makes a minimum up-and-down and forward clearance, while Dillard rises to a peak height early, so that his path of flight is quite flat or sustained. Duff



and speed between the hurdles. *(Ed. note:* For purposes of clarity, the pictures of Dillard and Duff have been reversed. That is, Dillard, who is shown here leading with his right leg, actually leads with his left; while Duff, who is shown leading with his left leg, actually does so with his right. It was thought that this method of mounting the pictures would facilitate their use by coaches without detracting from the mechanics of form.) Dillard, Duff, and Finley ran these hurdles expressly for Richard V. Ganslen, whose scientific findings therefrom appear in his article on pages 11, 56-59.

We try and work our hurdlers in groups so that they get the feel of having even running on either side of them. We have them change lanes in practice so they are accustomed to having men that lead with the right leg and then men leading with the left on either side. I believe this is important because every once in a while we do get some unintentional bumping of arms and I feel a man should practice under the same conditions.

We try to get considerable sprint work in our workouts, at least one day a week being devoted to this. We stress limberness and lots of loosening exercises all the time. If we can get our hurdlers good and loose with the feeling of dominating that hurdle as they approach it, we feel we have our hurdlers off to a good start. Then we can concentrate on the fundamental points mentioned before such as the approach, arm action over the hurdles, length of stride between hurdles, etc. It takes a lot of long, conscientious practice but this is a "must" if a hurdler is going to score many points for you today.

* * * * *

Question--Why do you use four hurdles in practice? I always use three or five.
Answer--There isn't any particular reason; I guess it's just a matter of habit.

Question--Why not use one hurdle? That's what Attlesey did.
Answer--With one hurdle you don't get the feeling of the action between hurdles.

Question--Do you time your boys?
Answer--Once in a while. Stevens did 11.8 or 11.9 on the flat. One of my boys did 12.1 but can only do 15.7 over the hurdles. He's a little short for the highs.

Question--How about five steps during practice?
Answer--It's all right for warming up or early in the year but only for the first three or four times through.

THE HIGH HURDLES

by: Johnny Morriss
University of Houston

There is, at present, no book published which deals entirely with hurdling techniques, especially with teaching beginners. A coach must face many problems in selecting candidates who would like to be hurdlers. Some of these problems are easier to solve if a plan is developed and followed in selecting prospects and training beginners. The writer has had considerable experience as a competitor in the hurdles and as a high school and college coach. The suggestions which are presented here are the results of this experience and are offered as an aid in developing hurdlers.

Selection of candidates may be handled a number of ways, but naturally the most difficult problem confronts the coach who must start from scratch. Since nearly every coach finds himself in this situation at some time in his career I would suggest that he get permission from the head of the physical education department or the principal to conduct a few tests.

The best three events to use in this test for hurdling candidates appear to be the broad jump, the high jump and the 100-yard dash. A hurdler must be reasonably tall, so the coach should take all of his tall boys and give them the above test. The dozen or so who make the best all-around results generally can be developed into pretty fair hurdlers, provided, of course, that they have these requirements: co-ordination, average amount of speed, good timing, intestinal fortitude and above all the will to work hard.

When this selection has been made, the problem of how to start the beginners arises. If a green man is put right to work on the hurdles, the chances are his immediate failures will discourage him. His desire to learn and curiosity about the hurdles should be kept alive until the coach feels the time is ripe to let him try to take a hurdle. To bridge the gap between the selection of the candidate and his first attempt at the hurdles, a rather thorough routine of preliminary exercise should be outlined. These exercises prepare the hurdle candidate for the actual event and school him in the fundamentals of hurdling. At their conclusion he has enough hurdling know-how to take him out of the greenhorn stage before he ever attempts to clear a hurdle. His first hurdling, therefore is likely to result in success, and if there is any better way of holding a boy's interest than success, we have yet to hear of it.

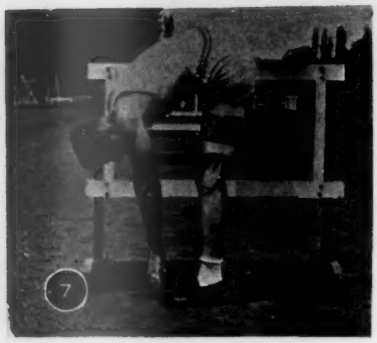
These exercises are fundamentally for hurdlers, but they are also very good for the entire track squad. It is suggested that they be taken daily by the entire squad during the early part of each day's practice. A lot of boys may not be able to take some of the exercises over two or three times to begin with, but they should gradually build up until they can do at least ten apiece.

This is the time to teach track men good warm-up habits. They must be made to realize that better performances will come from correct warm-ups and exercises before going into competition. Muscles which are in tone, stretched and relaxed always give a better performance.

Fundamentally, all exercises are given to develop the front leg or lead leg (leg that goes over the hurdle first); rear leg or trail leg (leg that is last over the hurdle); body dip or buck (thrusting of body and arms toward lead leg); and, arm action (double or single-arm lead). These hurdling terms should be remembered for they will be repeated many times throughout this article.

The exercises shown are not only for beginning hurdlers but advanced hurdlers as well. They are broken into two classes: general conditioning exercises and stretching exercises, and are for use by all hurdlers regardless of the extent of their experience. These exercises are specifically selected as an aid to developing hurdling techniques.

The general conditioning exercises are to occupy the beginners' full time, along with easy jogging, for the first four weeks. The prospect should spend about forty-five minutes daily doing these exercises and jogging. The two should be alternated. It is wise to have candidates alternate exercises and not do too many of the same ones at one time. The coach should be particularly careful at this time to keep his men from doing any fast work until they have had at least a month of background work. He should urge them to do their jogging as well as their flat exercise on the grass.



JOHNNY MORRISS

This illustration shows the side-stride exercise. It is mainly for developing timing and co-ordination between the balance-arm and back-leg drag.

Illustration 1 shows an exercise to condition hand, wrist, forearm, arm, shoulder and stomach muscles. Illustration 2. This exercise is mainly to condition stomach muscles. Illustrations 3 and 4 are stretching exercises to condition stomach, back and legs. Illustrations 5, 6, 7 and 8 are hurdling exercises which every beginner and good hurdler should use to warm up with to loosen-up back muscles, stretch leg muscles and work on lead leg and drag-leg action.

Bad habits are easily picked up, and once established, are very difficult to break. Good habits can be formed by beginners as readily as bad ones. If the correct principles are taught, they are never forgotten. Even a seasoned hurdler can tell what he is doing wrong but generally he needs suggestions before he can straighten out his difficulties.

All of this may seem like a lot of preliminary work but it is definitely needed and will pay dividends with one's hurdlers.

When a coach feels his boys are ready for over-the-hurdle work, particular attention should be devoted to body and arm drive, front-leg whip-up, back-leg drag, and above all, the timing and co-ordination of the balance arm cutaway. This can be accomplished by side-stride work and with five steps over the hurdle.

Let's assume the hurdlers are now ready for fast work. Hurdling is divided into six parts, the start, approaching the hurdle, the carriage over the hurdle, landing, between hurdles, and the finish. Each part will be discussed separately.

THE START: All sprinter type or shorter-legged boys should take eight strides to the first hurdle, whereas the longer-legged boys or striders may be able to handle seven strides. I prefer to have hurdlers use eight strides to the first hurdle. As a rule, the hurdler can develop his speed and have control and balance by the time he reaches the first hurdle. It is my opinion that the start is very important in high hurdling, for hurdling requires rhythm, running and jumping worked off of speed, skill, co-ordination, and timing.

Sometimes it is necessary to change a hurdler's feet in starting. When this must be done it becomes necessary to do a lot of starting work on the flat and with a gun. The hurdler has to change arm and leg co-ordination work especially for the first three steps. This requires a lot of effort and thought to change a left-footed starter to a right-footed one or vice versa.

A quick cue to remember in strides to the first hurdle is--if a hurdler takes eight strides to the first hurdle, his lead leg will be his back leg in starting--if he takes seven strides, his take-off leg will be his back leg.

Oftentimes in early season, a hurdler is stretching for the first hurdle or for his take-off area. In this case the hurdle should be placed 14½ yards from the start instead of the regulation 15 yards. This will enable him to take the first hurdle without stretching or straining. This should be continued in practice until he is able to stretch out naturally without straining to make the first hurdle at the required distance.

APPROACHING THE HURDLE: It is extremely important in high hurdling that the hurdler be running at about 7/8 speed at his take-off going into the hurdle. He should definitely have control of his body at the take-off and should be relaxed and concentrate on the on-coming hurdle. His body should be slightly forward with his eyes focused on the top of the on-coming hurdle until the take-off; then he should pick up the top of the next hurdle or the finish line, whichever is next.

As soon as the hurdler hits his take-off foot, it should be pointed straight down the track, perpendicular to the hurdle. This must be watched closely for a push-off sideways wastes 20 to 30 per cent of the hurdler's driving power, thereby decreasing his speed and sending him into the hurdle slightly off-balance or sideways. Ordinarily the take-off will vary slightly, depending on the height of the hurdler. In the high hurdles it will vary from about 6'10" to 7'6".

The lead leg comes out of a natural stride to lift toward the top of the hurdle. It is lifted with a vigorous motion from the hip. The lead leg should be slightly flexed at the knee. A short-legged hurdler will probably use a straight lead-leg lay-out.

The arm and body drive should start forward as soon as the lead leg starts up. This should be done in a vigorous manner to get the maximum drive or impetus going into the hurdle. Some coaches refer to this as bucking the hurdle.

As to arm action, there are two distinct types: single and double. There are many abbreviated forms of these two. Personally, I prefer the double-arm action. In my mind it is much easier to teach beginners and a hurdler does not have to have as much co-ordination using the double-arm action.

THE CARRIAGE OVER THE HURDLE: The arm action, front-leg lead, and back-leg drag play a very important role here.

In the front-leg lead, the toe should be turned down, the heel held up towards the achilles tendon, the knee flexed. The lead foot should be whipped toward the top of the hurdle but slightly off center. The hips and trunk of the body should go over the center of the hurdle.

The arms should be thrust in a vigorous manner toward the lead leg. Assuming that the left leg is the lead leg, the right arm or the balance arm should be fully extended with the palm of the right hand parallel to the track. The right hand should be about twelve inches away from the foot and extended slightly beyond the left toe. The left arm or off arm should be slightly flexed, the hand not fully extended, but held at about 7/8 length, the palm down in a relaxed manner. The left hand should be not more than six inches away from the left ankle.

The drag leg comes out of its natural stride, the foot should push straight off the track and be fully extended to get maximum drive. The lift starts slowly, with the knee above the foot and a gradual pull from the hip. When the drag-leg knee gets about eighteen inches from the top of the hurdle the pull becomes vigorous to help accelerate the body over the hurdle.

At one time over the hurdle there is a slightly "dead" pause when the lead leg is almost at full length, arm and body drive in its lay-out, and when the drag-leg knee and foot, all are almost at right angles. There are three things that can carry a hurdler through this pause and help him over the hurdle: One is his momentum into the hurdle, another a fast back-leg action, perfectly timed, and finally the lead-leg snap-down accompanied by body dip.

THE LANDING: The front-leg snap-down plays an important part in coming off the hurdle. A beginner has to be careful using this, however, for it will whip him off his feet, throw him off balance, make him raise his body too fast or land on his heel if it is not timed properly. A good hurdler should ride his body drive and his momentum out until he feels that his buttock is right over the top of the hurdle. Then he should whip his front leg down, retain his body lean, start his balance-arm cut and complete his back-leg pull-through. This should all be timed so well that when his lead foot lands, his body lean is still forward, his balance arm is about half way through its cut in a down and out position, his drag leg is pulled through vigorously from his hip, his knee is higher than his foot in an outstretched manner. When the front foot lands, the balance arm and drag leg should be at least half way through their respective cuts.

BETWEEN THE HURDLES: When the hurdler lands on his lead leg, his balance arm, body lean, and drag leg should be timed perfectly so he is in running position. His arms should be pumped like a sprinter, he should retain his body lean between the hurdles and his eyes should be focused on the top of the on-coming hurdle. A hurdler should concentrate on hurdling and never let his mind wander or his eyes drift out of his running or hurdling line.

THE FINISH: When the hurdler comes off the last hurdle he should immediately focus his eyes on the finish line. As soon as he can attain his balance and body lean, he should shorten his stride and run like a sprinter through the finish.

* *

(Editor's Notes from Mr. Morriss' talk) Three points: You can't start body lean too soon; you can't pull the back leg too fast; you can't pull the arm through too slow. He emphasized the last point: "Even great hurdlers try to get off the hurdle too soon and hurry the arm".--- "Delay the arm cut and give the back leg pull a chance to operate."

In the fall every one on the team, including the milers, works on 400 meter hurdles.

Time to the first hurdle is very important. A good hurdler will reach the top of the first hurdle in 2.2 or 2.3 seconds; a fair hurdler will take 2.4 or 2.5 seconds.

THE 400 METER HURDLES

By Louis C. Montgomery
Cornell University

At the 1952 N. C. A. A. clinic, I presented in writing an article on this event and opened the subject with the presentation of written material I had found pertaining to the event. I mentioned Dean Cromwell[1] and Bresnaham and Tuttle[2], articles in their books.

Not much more has been written on the subject, but Lord Burghley, K. C. M. G. writes an article in H. A. Meyer's "Athletics"[3], which treats the 400 meter hurdles from his own personal experience. I believe this is the most comprehensive material on the subject I have read. I recommend it to you. I was happy to find that many of the points I have noticed in this event coincide with the thinking of Lord Burghley, who represented Great Britain in the event in three Olympics.

John LeMasurier in "How I Teach Better Athletics"[4] touches the subject lightly in his chapter on HURDLES in which he combines all phases of hurdling in the same treatment and only differentiates the 400 meter hurdles from the others by the number of strides to the first hurdle and between the hurdles and the placing of the feet at the start, depending on the number of strides to the first hurdle. I might mention that I covered this phase of the event in my 1952 article when I mentioned that Charles H. Moore, if he were going to take thirteen steps between the hurdles, knelt on the right knee. If he were planning to take fifteen steps he knelt on his left knee, the leg he led with, and took twenty-two steps to the first hurdle.

Perhaps I have not looked well enough but I have not found any other material on the subject. I might say that John Morris, now at the University of Houston, in a clinic in New York, told how he always had a flight of 400 meter hurdles set up on the track at all times and every man had to run one flight during his warm-up drill. I use this and find it helpful and a challenge to most of the men.

So in my talk on 400 meter hurdles, I fear I will have to repeat much of the material already covered, and hope you will bear with me.

I do not believe that a man's ability to run the 440 yard run is a pure criterion of his ability to handle the 400 meter hurdles. In most track events we can list the most important qualifications for success such as skill, speed, courage, endurance, etc. In the 400 meter hurdles I believe the mental and physical qualifications sort of blend in with each other, intertwine so to speak, and depend on each other in sort of a partnership that makes it seemingly impossible to list any one qualification first in importance. A desire to run the event is certainly needed. Courage is definitely a needed trait. Speed, endurance, skill, style or form are certainly needed. Rhythm, agility and the height of the hurdler, plus his leg length, all have bearings on his success. Lord Burghley says, "A modified form of the normal High Hurdler technique without the chop down landing"[5] is used. He calls it one of the most exacting races in track and lists the requirements as ability to run a fast 440 and a fair 880 yards, technique of hurdling, rhythm and energy[6]. He lists style, speed and stamina in that order, with unbroken rhythm very important and vital. A broken rhythm slows the competitor down and can be caused by a variety of common movements, most common of which is of the hip of the trailing leg not being flexible enough to allow the trail leg to come "through late".

Lord Burghley further states that the 400 M. H. demands the most careful conservation of energy, yet one can not run slowly or his stride will be upset. He also mentions the importance of the arms and gives the usual hurdle exercises which we have all seen hurdlers do while warming up. He suggests running up to the first hurdle from different places to get adjusted to the take-off. He also suggests the running of the race against a clock since this is important if one draws an outside lane, and he recommends that the final bid be made a few strides before the last hurdle instead of waiting until the last hurdle is cleared. The strategy will usually upset the opposition. He advises against too much training to avoid staleness and recommends the saving of energy in meets where two or three heats are required. His training schedule is the use of 440's, 300's and an occasional 600[7].

1 Championship Technique in Track and Field - McGraw Hill Book Co., Dean Cromwell, 1959
2 Track and Field Athletics, Bresnaham & Tuttle, C. V. Mosby Co., 1950
3 Lord Burghley on 400 Meter Hurdles, H. A. Meyer's Athletics, J. M. Dent & Sons, Ltd., London
4 John LeMasurier "How I Teach Better Athletics", Frederick Muller, Ltd., London
5 "Athletics" - H. A. Meyer, Dent & Sons, London, page 162
6 "Athletics" - H. A. Meyer, Dent & Sons, London, page 162
7 "Athletics" - H. A. Meyer, Dent & Sons, Ltd., London, page 166

As previously stated I believe Lord Burghley's chapter on the 400 M. H. is the best article on the subject that I have read and I again recommend it to you.

Der 400 M-Hürdenlauf[8]
by Walter Nehb

Translated for me from the German, by Professor Lange, Professor of German Literature at Cornell University.

Mr. Nehb has covered the 400 Meter hurdles most thoroughly and I sincerely recommend all interested to read it.

Salient features of Mr. Nehb's article: Condensed.

Qualifications: Speed is prime requisite; runner to be above average in height. Must have flexible hips, long legs.

The runner must have a desire to excel, strong will-power and courage.

X He claims it is wrong to think a slow 440 man should not attempt this event.

TECHNIQUE: Hurdler must learn to use either leg in hurdling. Lead leg should not be lifted too high.
He claims the take-off leg should not drag, but should be brought up as soon as possible after the leap.

Argue with this -

PSYCHOLOGY The author mentions the psychological elements of this event and believes them to be very important.

TRAINING SCHEDULE: Mr. Nehb gives a complete training schedule for winter and gives a 4 mos., day by day training for the event.
Stationary running, beginning with 20 sec and building it up to 2 and 3 minutes, interval running of 200's, 300's and 600's. Gymnastics, and easy rep'd running up to 3/4 mile, with many, many runs over and to the first hurdle and much work on the start. Runs over 6 hurdles, and frequent easy runs over all the hurdles.

List weaknesses of this event: Main weakness is no staying power.
Most 400 meter runners do not have the toughness to last.
The runner must punish himself and develop an iron will power.

Qualifications

HEIGHT: We have seen all sizes of track men excel in meet track events. But in the 400 meter hurdles a tall man has the advantage. If his leg length is not such that he can straddle the hurdle standing still, then he will necessarily have to jump a few inches instead of lunging. And yet there have been good 400 meter hurdlers who were not tall men, such as Johnny Gibson, Ham Hucker, Josh Culbreath, and others. Harry Hillman, C. J. Bacon, Hardin, Moore, Lituyev, Yoder, Blackman, DeVinney, Tisdale, Whittle are all men of above average height. These shorter men had to make up their disadvantage in height with speed, endurance and skill.

STYLE - RHYTHM - COORDINATION

FORM: Form is essential but the arm drive and front leg chop of the low hurdler, the extreme lunging and trunk bending of the high hurdler, are not the vital factors of success in the 400 meter hurdles. They might rather lead to disaster if used. A low hurdler can ignore form and depend entirely on speed and get by. The high hurdler who has extreme speed and form can hit a H. H., fall, and still get back into the race. The distance is so short that the competitor's endurance and stamina have not even been touched. But let a 400 meter hurdler lose his rhythm, let alone hit a hurdle and fall, and he will be very lucky to finish with a good performance. Therefore, endurance and stamina and rhythm seem to be more important than hurdle form as we know it.

I believe any form for this event is a modified form of the technique we use in the other hurdle

8 "Liechtathletik" - Der 400 Meter Hürdenlauf, by Walter Nehb, copyright 1950, Verlag fur Sport und Leibesübungen, Harry Battels, Berlin, Germany

events. The arms are used mostly for balance and only for drive during the running stages of the race. The body lunges at the hurdle but no attempt is necessary to "chop the lead leg down" as in the highs, but rather a sort of a float over the hurdle with the back leg trailing but well under control. The sort of form we do not want in the high hurdler beginner. The shoulders should be somewhat hunched forward but not an extreme trunk bending down action as in the highs. Balance upon landing with the ability to continue running is RHYTHM, is more important than beautiful form over the hurdle and far less dangerous.

SPEED: Speed in this event, like all other track and field events, is very essential. Starting speed and natural speed in any running distance up to an 880 is most necessary. A man should be able to break 50 in the 440 yards. If he can break 49 or 48 so much the better. A man who can run 49 should be able to break 22 in the 220 yard dash. A sprinter breaking 22 should be able to break 10 seconds in the 100 yard dash. And a 48 or 49 second 440 man should be able to run 1:12 for the 600 and 1:53-55 for the 880. This is what I call natural speed. Now, combine these speeds with the ability to break 15 in the 120 yard H. H. s and 23 in the 220 yard low hurdles, and you have the speed necessary to become a champion 400 meter hurdler.

ENDURANCE AND STAMINA: I said that a man's ability to run the 440 yard open race fast was not a pure yardstick as to his ability to become a great 400 meter hurdler. This is true. Endurance is most important. We all have seen 440 men try this event only to tire in the later stages of the race. We have seen beautiful high hurdlers look great over five 400 meter hurdles only to weaken the last part of the race. A good 220 low hurdler has more of a chance of developing into a 400 meter hurdler due to his endurance than does the high hurdler, in spite of the high hurdler's form advantage. But form goes out the window when stamina leaves the body.

I believe for a man to be a great 400 meter hurdler, and by great I mean under 52 or 53 seconds, he must have more than just ordinary 440 yard training. He must punish himself with 600 yard running in the winter meets, and occasionally run both high and low hurdles, along with the open 440 yard run and an occasional 880 yard race in a meet, in order to give all he has in a 400 meter hurdles race and still finish on his feet. The 400 meter hurdles event, as Dean Cromwell calls it, is a "man killer" and it is to the low or high hurdler, who has not worked hard on 440-600 and 880 yard training. Or to the 440 man who neglects to master the technique of hurdling to some degree and also run 600's and 880's.

MENTAL QUALIFICATIONS

COURAGE: A 400 meter hurdler must be a fighter and a competitor. He must not fear crashing into a hurdle or tripping over a hurdle. He must, therefore, develop a mean and nasty attitude toward the 10 obstacles that are in his path. He must have the courage to fight off fatigue in the later stages of the race and to believe in himself during the entire race, never doubting that he will keep his form and rhythm.

SELF CONFIDENCE - JUDGMENT: The competitor in this event must be a BLUE CHIPPER. That is, he must love to run against top competition and thrive on it. He must learn to hurdle with either leg and be ready to recognize any loss of speed and rhythm so that he can adjust for the next hurdle, plan a hurdle ahead, so to speak, and not wait until he is upon the hurdle before realizing he has the wrong foot ready.

To list these qualifications in order of their importance would be very difficult as I believe they must blend in with each other. But I feel that ENDURANCE, then SPEED, then rhythm, form and style would follow.

Our champions have all had speed and endurance. Roy Cochran was a champion low hurdler and won many indoor 600 yard races. Charley Moore had the speed that I mentioned previously. He could and did run 9.9 in the 100; 21.6 in the 220; 47 in the 440; could break 2:00 in the 880; ran 14.5 in the highs and 22.7 in the lows. He won many indoor 500 and 600 yard races; he did 1:11 in the 600. As to Moore's mental qualifications, I found them ideal. He was a fighter, had a world of courage, loved to run against the best, and had all the self confidence a man could possess. He became quiet and would work himself up to a nasty disposition just before a big race. I learned to leave him alone and I dispensed with any last minute instructions.

In the final of the 1952 Olympics, Moore drew the outside lane. This alone would have defeated many men. Here is where knowing pace, or running against a clock as Lord Burghley mentions above, pays off.

Much excitement was exhibited by the Russians when they found that Moore was taking 13 steps between the hurdles. I will not go into Moore's 13 steps now as I explained about that in my 1952 article. However, if there is time after I have covered the subject matter I will be glad to answer questions.

The Russians have established one thing. That is, if this event is given publicity and a place in the track program, many good 400 meter hurdlers can be developed. The open 440 yard race years ago used to be feared by most runners. Mile relays have overcome this fear of running the 440 in a dash style and I believe that the 400 meter hurdle race, if given the opportunity, would also prove an illusion. Hard work, self discipline, and better knowledge of training have lowered records from the marathon on down. So why not the 400 meter hurdles? Take the mile run out of the track program except for Olympic years and see how slow the event would get.

SOME ADDITIONAL NOTES

All track men of experience tend to run as close to the inside of their lanes as possible. This is especially valuable in the 400 meter hurdles and one more reason why the hurdler should lead with his left leg. There is a tendency of the hurdler when going to the first hurdle, which is usually on the curve or turn of the track, to swerve out so as to take the hurdle straight on. This fault costs time and rhythm. I like to have my men turn their right foot inward on their last step to the first hurdle, thus taking the hurdle on a slight inward angle rather than landing far to the right of their lane, and then make a deliberate turn and adjustment of balance, rhythm and speed on their way to the 2nd hurdle. Charlie Moore was especially good at this and many times his lead leg was thrown outside the hurdle but high over the extended plane of the hurdle. Repetition and many starts going over the first hurdle with this in mind will develop confidence and save valuable seconds.

Fatigue in the 400 meter hurdles comes all of a sudden to the inexperienced man. It does not come with an increasing of tiredness that slows the runner down gradually as in the flat 400 meter race. This completely fools the hurdler as the "bottom" sort of falls out of him, and many quit. This generally happens around the 6th and 7th hurdle. This "suddenness" of being all-in often causes the hurdler to quit just when you think he is doing nicely. It is a new experience to the 440 man, this being all-in "all of a sudden".

Therefore I recommend that new men trying the 400 meter hurdles should never be allowed to try the full flight until they have worked with confidence over 5, then many times over 6, then 7, then 8, etc. I believe this "all out feeling" is caused by the sudden realization of the hurdler that he has unconsciously shortened his stride due to the natural process of fatigue setting in, and unlike the middle distance runner who can at least keep his rhythm and fight on, the 400 meter hurdler must clear a 3 foot barrier about every forty yards, a barrier that seems to get higher and higher as the race progresses. This shortening of his stride, naturally results with the hurdler's rhythm being broken and extra steps needed to clear the hurdle, or crash into it, or make some attempt at jumping it or running around it.

Whichever he does, he loses his rhythm, his confidence and only the exceptional, experienced man will "fight on" trying to get back into the rhythm of the event. It is this upsetting experience that causes the hurdler to "all of a sudden feel all-in." Psychology therefore plays a very important part in this event. Confidence in getting over the first hurdle in good balance, and to keep his rhythm over each succeeding barrier, BUT most important is that the hurdler MUST learn to quickly recognize any slowing down of his speed and correct the fault one full hurdle ahead of time. For example, the hurdler must concentrate on how he approached and cleared the last hurdle. Was his take off satisfactory? Did he have to stretch for it? If not, then all is well for the next flight. But if he noticed that he had to STRETCH the last two steps to get his take off properly, then this should tell him he MUST WORK HARD on this next flight to regain his speed and rhythm. If the hurdler develops this habit of recognizing loss of form or speed one hurdle ahead, then he will not run into this "all out feeling" but will continue the race, running each hurdle as a separate race and finishing the race with the normal and gradual approach of fatigue.

To help the beginner overcome and possibly escape this "all out feeling" experience, I have found that, by marking a white line on the track for each of his 15 steps, from the 5th hurdle on, he is forced to concentrate and KEEP his rhythm by stepping on each white line. The hurdler will quickly notice where he must begin to increase his effort in order to match the designated strides. By frequent runs over the marked course, the runner will soon learn to "steel" himself to fatigue, to fight harder when his stride begins to shorten, and soon confidence of finishing will be taught.

The 400 meter hurdler has a right to develop self-confidence and self-esteem. He is of a select few, who have chosen this man-killing event. This alone should develop a poise that is necessary in this event. Stamina, speed, rhythm and form are very necessary we know, but courage and confidence in one's self is extremely vital to success. I like Rudyard Kipling's lines which clearly exemplify the effort needed for the 400 meter hurdles, as follows:

"If you can force your heart and nerve and sinew

CHARLIE MOORE

To serve you long after you are gone,
And so hold on when there is nothing in you
Except the WILL which says to them: "HOLD ON".

A STUDY OF CHARLES H. MOORE, JR'S SPLIT TIMES IN HIS 1952 OLYMPIC SEMI-FINAL HEAT.

These were taken as the crotch passed over the hurdle.

1	2	3	4	5	6	7	8	9	10	F
6.2	10.3	14.4	18.5	22.7	27	31.6	36.2	40.8	45.4	50.8

The elapsed times, therefore, between each hurdle were:

6.2	4.1	4.1	4.1	4.2	4.3	4.6	4.6	4.6	4.6	5.4	50.8

The times shown afford an interesting study on the consistent speed over the first four hurdles and then the gradual but expected diminishing of stamina and slowing down over the next three, the 5th, 6th and 7th hurdles, and then the consistent or holding on of this pace over the 7th, 8th, 9th and 10th hurdles and his drive to the finish clearly demonstrate the terrific effort and determination needed to "HOLD ON" and force the body to continue at this pace. If I remember right, this heat broke or tied the Olympic record and Moore was not pressed. I seem to remember that Charlie told me he was surprised at the time. Would it be correct in assuming that Moore while fresh, went all out over the first four hurdles, gradually caught or came along side of the leading man, regardless of what lane the leader was in, and then realizing he had the race if he held this rhythm and pace, stayed steady with this 4.6 over the last four hurdles? Could be this effort, if the facts are true, clearly demonstrates that when one runs relaxed and with confidence, he runs fastest.

The final of this event in the Olympics, I believe, was run in the same time. But Moore drew the outside lane which as we know is a mental and physical handicap. It forces the runner to run all out against a clock - he sets the pace for all others and never knows where he is until coming off the final turn. I like to play with mental calculations of what Moore would have done in that final race had he been in the 2nd or 3rd lane.

CONCLUSION AND SUMMARY:

Endurance, speed, rhythm and form or style in that order of importance.
That the 400 meter hurdles event needs more opportunity for competition.
That it is not the "man killer" that so many think, but is just unexplored territory.
That low or high hurdlers without 440-600 yard competition will not be successful.
That to be able to run a fast 440 yard run is not enough.
That mental qualifications of courage, desire and self confidence are necessary.
That hurdling form is essential but should be modified and stress placed on safety and balance over the hurdle and balance upon landing.
That speed, initial and natural, are vitally important.
That hard work, and plenty of it, is necessary.
That height of the hurdler is important but not of all importance.

In conclusion I would like to see men like Sowell, Whitfield, Lou Jones, Jenkins, and Spurrier master the least bit of hurdle technique and then run the 400 meter hurdles. I believe we would see times under 50 seconds.

In closing I wish to thank all of you for your attention and the committee for honoring me with the opportunity to talk to you at this clinic.

THE 400 METER HURDLES

By Thomas W. Botts
University of Missouri

It is a well known saying that "fools rush in where angels fear to tread". I feel somewhat that way today, speaking before a group of experts which not only include coaches from abroad, where the 400 meter hurdle race is a regular event on their program, but also American coaches who have developed great intermediate hurdlers.

I did have the pleasure and privilege of working with Richard F. Ault, Olympic Team member in 1948. Dick placed 4th in the games in London in 1948, and in three subsequent Foreign Tours was defeated only once, running some twenty-two 400 meter hurdle races overseas. In 1949 he was abroad twice and lost that year only to Charles Moore of Cornell in the National A. A. U. meet at Fresno, California. He was ranked No. 2 in the world in 1949, running some eight (8) races in his brief career between :51. 4 and :51. 8. He is now coaching at Highland Park High School in Illinois after a very successful career at his alma mater, Roosevelt High School in St. Louis, Missouri.

Dick's success has been the inspiration for others at Missouri, and we have had one or more boys running the race every year since his graduation in 1949. Much that I know about the event I have learned from him.

For success in this event, I believe a man should have some hurdling ability, plus the ability to run a good 440 or even an 880. Ault was a high school hurdler and quarter miler and a fine college low hurdler. His 440 times were only fair since he was not real fast, but he was a great competitor and by concentrating on each hurdle in turn, the race seemed shorter and easier to him than the flat 440 race.

The number of strides to the first hurdle is an individual matter. Most of our boys have taken 22 steps but some may use 20 or 21. The hurdle clearance form is about halfway between the highs and lows, but more relaxed than either. There should be enough body bend to keep the head on a level plane using the arm thrust, but only vigorous enough to maintain balance and keep the weight forward so there is no hesitancy on the recovery stride. The lead arm could well be thrust somewhat to the left on the curves. Again, relaxation, almost resting over the hurdle, is a must.

Our hurdlers have all tried to run the entire race with 15 strides between. It has been our experience that 13 strides are too tiring. Ault and others have been forced to chop a little for the first 3 to 5 hurdles with a little extra effort toward the end of the race. Dick ran the outside of his lane around the first curve, preferring to sacrifice distance to gain proper stride. He also worked out an interesting check mark plan which he applied to each hurdle, similar to that used by vaulters or broad jumpers. He scratched marks with his spikes 43', 28', and 14' before each hurdle. The 43' mark was six strides, including the hurdle step, from the hurdle, the 28' mark four strides and 14' mark two strides. He would attempt to hit each mark with his right or lead foot. As his skill increased, he used only the 43' mark. These seemed to give him confidence beyond that provided by his visual judgement of distance.

Perhaps it would not work for others, but he is convinced it helped him.

As to pace, we have generally worked on the basis of a two second slow down for the second 220. Possibly the 220's should be even more nearly the same time.

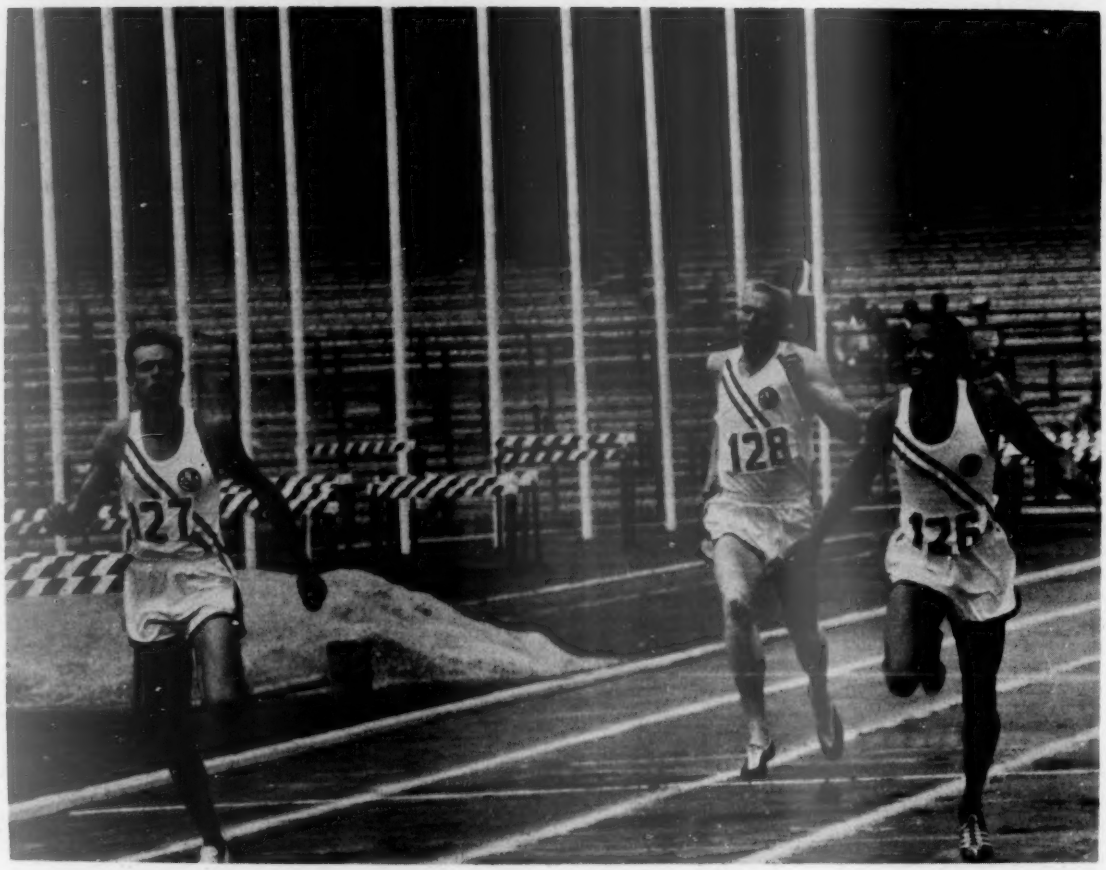
In training, we combined starting and other speed training with endurance work and practice over the hurdles. A full flight, especially for a beginner, might be run once a week in practice, one or two 660's a week may prove helpful and much repeat running over 4 - 6 hurdles.

Below is a sample mid-season schedule suggested by Dick.

Monday---Warm-up - 660 or 880 starts to first hurdles
Tuesday-- Warm-up - 4 laps of wind sprints work over first 3 hurdles
Wednesday-Warm-up - either 2 - 330's (over hurdles) or 3 - 220's (over hurdles)
Thursday--Warm-up - 4 - 6 starts taking first 3 hurdles, four in and out 110's
Friday----Warm-up - Light workout over the hurdles for form only or rest
Saturday--Competition - Regular warm-up pattern, couple of starts over the hurdles, relax for race.

The mental attitude of this race is all important. The runner must have confidence, poise and the mental discipline approaching that of a middle distance runner.

He must be confident that he can maintain stride throughout. He must concentrate on each hurdle and eliminate worry, and remember that all races are judged at the finish line.



Lou Jones Winning Pan-American Games in World Record Time (1954).

THE 400-METER RUN

Rec 45.4 41. 1960

By: George T. Eastment
Manhattan College

Mr. Chairman, our very distinguished guests, fellow coaches:

When Bud Winter, our Chairman, wrote to me a few months ago and asked me to speak at this International Clinic I was greatly honored, and I wish to publicly thank him and the members of his committee for the invitation.

Due to my work on the N.C.A.A. Track and Field Rules Committee, I have been forced to miss several sessions of this Clinic. I shall always regret this and look forward to getting the printed reports on the talks that I missed.

In dealing with the quarter mile or its metric equivalent of 400 meters, we might first look to see in what category we place it. It has always been known as the 440 yard run, but of late we often find it listed as the 440 yard dash. I might summarize it by quoting Lou Jones who in a talk to a group in New York called it "a heck of a long sprint."

I will take just a minute to briefly trace the history of the event under discussion. Seventy-five years ago, in 1881, Lon Meyers ran 440 yards in 48.6 seconds. In the next fifty years, a half-century, the record was lowered by only 1.2 seconds, as a result of a 47.4 by Ted Meredith in 1916 and Vic Williams in 1931.

The second era started in 1932 when Ben Eastman of Stanford ran 46.4 for 440 yards, and in 1933 Bill Carr of the University of Pennsylvania ran 46.2 for 400 meters. In 1939 Rudolph Harbig of Germany lowered the 400 meter record to 46 flat and in 1941 Grover Klemmer, of our host school, the University of California, ran 46.4 for the quarter and 46 flat for its metric equivalent. Then along came the truly great Herb McKenley with records of 46 for the quarter and 45.9 for 400 meters. George Rhoden in 1952 lowered the 400 time to 45.8.

It is my opinion that we are now in a third era, started last year when Lou Jones, whom I was privileged to coach at Manhattan College, won the Pan-American Games in 45.4 seconds for a new record. Only a few weeks ago Jim Lea, Southern California graduate, ran the quarter-mile in 45.8.

The four-minute mile, the sixty foot shot, the quarters under 46 seconds. A generation ago such things were considered impossible by most fans, athletes and coaches. In this era I believe we will see a quarter run in the unbelievable time of 45 seconds and 400 meters in close to 44 seconds. This statement may sound fantastic to some, but I know that there are many who believe that it will happen.

I do not feel that such times are either fantastic, improbable or impossible. Several tangible factors enter into my reasoning on this subject. At the present time, we have here in the United States hundreds of outstanding men continuing to train and compete after their graduation from college. Until recently, 99 out of 100 dropped out of the sport immediately after their college careers had ended. How many times have you said, "If I only had him for another year,"or "Just as he was reaching his peak he graduated," or other similar remarks. Today these men keep going and they are bearing out your predictions. Horace Ashenfelter of Penn State was unquestionably an outstanding runner for "Chic" Werner, but I can recall "Chic" telling me that if "Ash" kept going he would become one of the greatest in the world. The record of Ashenfelter's performance shows how right "Chic" was. I will not take the time to run down the list of the many others, but we all know that we lose them in college just about the time that they become men and cease to be boys.

Tracks, of course, are faster than ever before, but I feel that men like yourselves deserve a great deal of the credit. All of us are accumulating a greater and greater knowledge of our field and we are passing it on by word of mouth and by writing to all parts of the world. The fact that we are gathered here at this great International Clinic is ample proof of my statement.

After twenty-eight years of coaching and a very undistinguished seven years of trying to be a quarter-miler, I also have very strong feelings on another important point. The athlete of today is far

more serious; he works harder; he is larger and stronger; he is better fed, and he gets far more beneficial competition than his predecessors. While all of these things are of vital importance, I do feel that there is one other very important thing happening. I mean that we, and in turn our athletes, think differently. We no longer think that we know it all, we are continually looking ahead, we do not become content when we reach a given goal, but now set new goals at our very next work-out. We are not afraid to experiment with new ideas, and, most important, our athletes have gone right along with us. Today the relationship of most coaches to his team is very similar to that of a father and son. Their confidence in one another is unshakeable.

Relay running, the backbone of track, has played an important part in the development of our quarter-milers. The mile relay, an integral part of almost every track meet, has created great interest in the quarter and has kept many men on our squads who would have either never come out for track, or who would have quit early. Some of these men have gone on to greatness, and Lou Jones is one of them. His high school coach, Mr. O'Brien of New Rochelle High School in New York, told me that he got Lou out and kept him out by interesting him in the one and two-mile relays. Lou had been more interested in football.

Reports come to us from the South and here on the coast of 47+ times for high school boys. We do not have this type of startling times back East, but we do have over twenty high school boys under 50 in the New York, New Jersey and Connecticut area. When I look back and compare this with the standard of 53 during the 20's and 52 in the 30's, I cannot help but visualize the times I mentioned a few minutes ago. Years ago most boys who first reported for track had the desire to become sprinters, and even though they failed at the 100 and 220 had little desire to move up to greater distances. Today, after failing to produce as a sprinter, the boys eagerly move up to the quarter, half and mile. Many of our top middle distance men of today are converted sprinters.

In the early 1930's, the pattern under which we now work was set and for the first time was recognized throughout the country. This pattern was speed and still more speed. The question now arose and it is still the burning one today, what kind of work will develop speed and even more important to the quarter-miler, how can he not only develop his speed but also be able to carry it over the quarter-mile route.

Many years ago training was conducted by most on a two or three day a week basis, with the greatest emphasis on overdistance running. The quarter was a sprint for fifty yards, a "float" for three hundred, and a drive over the last ninety. Later we find that the pattern changes, insofar as overdistance for quarter-milers. We also found that our quarter-milers started thinking, as did their coaches, of course, of sprinting and in place of the 300 we found them running 50's, 100's and 150's with the sprinters.

Dr. Kenneth Doherty of the University of Pennsylvania, in his outstanding book on track and field, has a most interesting and informative chart breaking down the quarter-mile into four parts and giving the fractional time achieved by many runners at the end of each 110 yards. I urge all to study this chart because it tells an important story. Athletes from the 46 seconds category up to the 54 second group were studied. The most interesting point is that regardless of the ability of the athlete, he found a "let down" of just about four seconds in the second half of the race. For example, the 48 second quarter-miler ran 22 for his first 220 and 26 for his second. The 54 second quarter-miler ran 25 and 29.

In talking to Herb McKenley here last week he informed me that when he ran 46 seconds for 440 yards he ran close to 21 seconds for his first 220 and just under 25 for the last half of the race. Here again we find that four second figure and coaches, not too long ago, apparently decided that there must be a better way to run a quarter.

We first learned the value of even pace for our distance runners. Whether we are training men for one, two or more miles, our training uniformly endeavors to put together a series of quarters that are as even as is humanly possible to get them. When we first thought of the four-minute mile, we were thinking of four sixty-second quarters, and while it did not work out exactly that way, it was close: 58 - 60 - 62.7 and 58.7 or 1:58 for the first half and 2:01.4 for the second. A let-down of only 3 or 4 seconds between the first and second half-miles. Since then we have seen our great milers bring their quarters and halves even closer to our goal of even pace.

The same factor of even pace is becoming more and more pronounced in the half-mile. It has been my good fortune to watch Tom Courtney, formerly of Fordham University, for the past five years,

and I must add that my own runners mostly had a view of Tom's broad back. Whether Tom has run the 440 or 880, he has had less of a "let down" than any runner I have been able to observe. I have seen him run a quarter in 47.2 with the first 220 going in 22.8 and the second in 24.4, a difference of only 1.6 seconds between the first and second 220's. You have seen him run here on the coast, and many of you have seen him in Europe, and you must be familiar with his methods. I know that Tom is aiming for 1:46 within the next two weeks, and I further know that he hopes to do it with two quarters as close to 53 seconds as it is possible to get them.

Since we are, I believe, more or less in accord that even pace leads to the most successful effort, why is it that we do not find it in the quarter-mile? The answer is to be found in both the physical and mental problems involved. From the physical viewpoint, very few of our quarters are run in lanes; in fact, many if not most are run around one turn out of a 220 chute. The all-out drive to get to that turn in a good position and the need of maintaining that position is of the utmost concern. If we run the first 220 about a second slower than our opposition, we will find ourselves in "bad position." We may be boxed, have to run wide around curves, and will be challenged by each man that we seek to pass. With more and more meets adopting lanes for the 440 and 400, this problem is sure to be overcome. Equally, important is the mental problem. When an athlete sees the field pulling away from him, he will by instinct pick up his pace or he will become tense as a result of worrying about whether or not the leader will come back to him. This will be overcome by constant practice at agreed pace and of course by experience, the greatest teacher of all.

This general idea of a big major slowing down by our quarter-milers has had most of us thinking a great deal about the problem. As a result, I conducted an experiment with five second-string quarter-milers during the past six months and the results are very informative. The times of these five men varied from 52 to 53.5 seconds for 440 yards. Four of them, running as a relay, ran 3:31 in an indoor meet last January, with each man running about 23 seconds for his first 220. They had been training with the better men and were showing very little progress. They were not put into a separate group and their training pointed toward a 24-second 220 and a 37-second 330. There was no initial burst from the mark but rather a determined effort to keep it even all the way. Their work varied from our better boys only in that they had different goals for their fractional distances. At the Penn Relays, running in a non-championship or classified event, four of these boys composed a relay that ran about 3:24. Immediately thereafter we made one change in their workouts by inserting a 400 on Tuesday and Thursday. On May 12th we had a dual meet in which we were able to give these boys a chance. The second best of the group ran in the quarter and placed fourth with his best time ever of 49.7. The other four ran and won the mile relay in 3:20:1. Not fast for top college competition, but an improvement of 2.5 seconds per man on the average. The answer was quite simple; they had been running their first 220 much too fast. They were now running their first 220 in 24 seconds and their second in 26 seconds. All five of these boys are back next year; two will be seniors and three juniors, and I assure you I shall continue along the same lines with them, hoping to take a half second or more off of both their first and second 220's.

When I arrived here a week ago I learned some of the fractional times of the quarters run here on the coast in recent weeks and to my knowledge no one in the past has ever come as close to the perfect race. Jess Mortensen informed me that Jim Lea's 45.8 quarter was accomplished by running 22.6 and 23.2. Herb McKenley informed me that his almost impossible quarter of 44.6 on the B.W.I. relay team at the 1952 Olympics was accomplished by running about 22.2 for his first 220. This was probably as slow a first 220 as he had ever run. It is now general knowledge that Ralph Higgins of Oklahoma A. & M. has had Jesse Mashburn aiming for even pace for a long time. It was Ralph's intention to have Mashburn hit 34 seconds at the 330 mark. Our watches showed that he either hit it on the head or was so close the difference was immaterial. I will not attempt to quote all of the figures now, but those interested can get the fractional times on our top men for each 110 yards or 100 meters from Dr. Doherty who is compiling them.

Lou Jones came to me a year ago last January and we worked out a long-range plan along similar lines. While no accurate times are available, he had planned to run the first 300 meters in about 33.5 at the Pan-American Games. He thinks he was very close to it and the record indicates that he must have hit it. It is no longer a race of all out, and he who dies the least is the winner. It is now a cold mathematical problem, except that we are dealing with human beings.

What type of work will be necessary to accomplish the goals that coaches and athletes have set for top performance. Regardless of the ability of the man, we are only going to get his time down by first developing his natural speed and then training him to carry this speed over the quarter-mile route. The quarter-miler must be fast, but he must be relaxed. I shall never forget Mashburn as I saw him in

1952. Big and strong, he bulled his way through a fine quarter. Last Saturday, still big and strong but now relaxed and confident, his quarter was the smoothest I have ever seen run.

If we are going to continue to stress speed, we are going to need more and more basic conditioning. I consider a pre-season period of over-distance running of two months absolutely essential. Our season starts in the Fall for all members of our squad. The distance men, of course, have their regular cross country season. Our quarter-milers report three to five days a week. Three days each week are devoted to distance running. They run cross country but no times are taken, there is no competition and the distance is never more than three miles. After about four weeks we start our "ins and outs" on the grass, with the boys going about 150 yards at three-quarter speed and jogging about 300 yards in between. This type of workout continues until we get on the "boards" about December 1st.

During this early season we stress exercises a great deal. We have three basic ones that the boys must take, but can be added to as they see fit. We do toe-touching, sit-ups and push-ups. These three stretch and strengthen the muscles of the legs and the stomach and develop the upper body.

For those who may be concerned that this distance running will kill speed, I can tell you that Stanfield and Remigino did it from March 15th to about April 10th in 1952. Three months later they won the 100 and 200 meter Olympic Championships.

Before coming here from the East, I discussed with six coaches seven of their athletes who had broken down last winter and spring. Since my arrival here I have had further discussions on the subject with some of you men. In every case of an athlete who came down with leg trouble and whose history I was able to secure, fourteen in all, the athlete had not had a sound base. He had either not taken his pre-season workouts or had gone at it in a very haphazard way. With this pre-season base, I am convinced that we are not only building strength which will eventually lead to speed but are cutting down on the risk of injury.

Each section of the world has its problems with training due to weather conditions. If it's not too hot it's too cold or windy or something else. Last winter and spring in the East were the worst from a training viewpoint I can ever remember. At most we had four good days last spring when we could really turn the boys loose. Yet, when the championships rolled around, the performances were uniformly good and the eastern boys did well in the N.C.A.A. championships last weekend. Years ago on bad days we either gave the boys a day off or simply said, "Go out and jog a couple of miles." Today we run them ins and outs until they can take the cold no longer or until they are so wet that further running is impossible. Since there are very few field houses in the East, we have been forced to improvise.

In and out running, whether it is done in good weather or bad, seems to answer many problems. It provides overdistance and speed running at the same time. In early season no effort is made to get any definite interval between the IN and OUT portions. Later we do set prescribed times and this time is lowered as the season progresses. The number of "Ins" and the interval must of necessity vary with each individual. The built-up sprinter can rarely do as many, nor can his interval be as short as the half-miler type who is coming down to the quarter.

I feel that this type of workout is the basic answer to our problem. It should be a part but not the entire program. I would consider two days a week in season and three days a week out of season as the maximum. The other days must be devoted to speed and pace.

As to starting practice, I feel that this should be done on Tuesdays and Wednesdays only, and according to a set plan. When Jess Hill was coaching the track team at Southern California he spoke at one of the clinics held in New York. He stressed, for many reasons, that starting practice should never be held on a Monday and from experience I agree heartily. Prior to the taking of gun starts, I feel that the athlete should take five or six mechanical starts to loosen up and prepare the muscles he will now bring into play. The starts themselves should be taken with other quarter-milers and not with dash men. The quarter-miler will naturally seek to outdo his sprinter teammate and the dangers are self-evident. He is not relaxed, he will strain and all too frequently an abnormal effort will result in an injury. I have very sad and concrete evidence on this point; one of our colleges in the East last winter lost two quarter-milers in one week under the conditions stated.

In starting our quarter-milers, I suggest an all out effort for twenty yards and then have them carry through up to about 120 yards at quarter-mile speed. This serves the two-fold function of, one, starting practice and, two, it teaches them the idea of shifting into a quarter-mile pace at the proper time. We are all aware that if the first burst is carried too far the athlete pays a heavy penalty in the

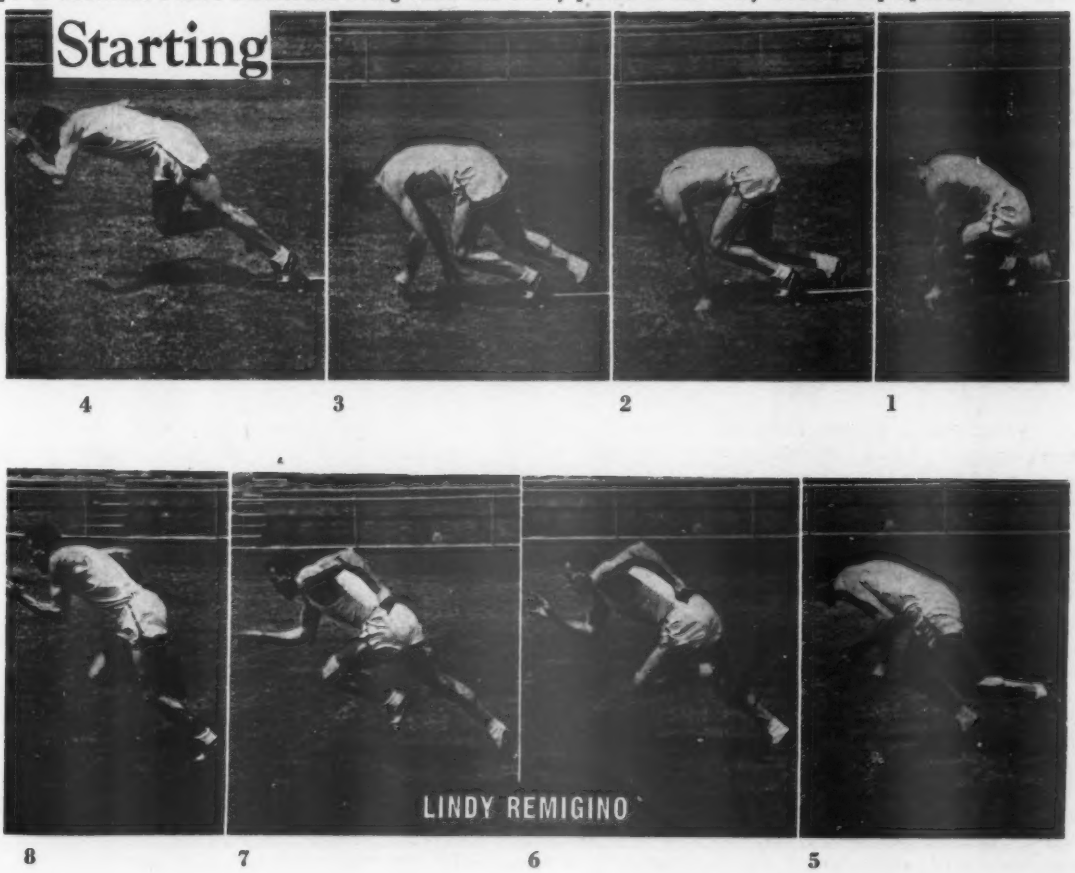
late stages of the race.

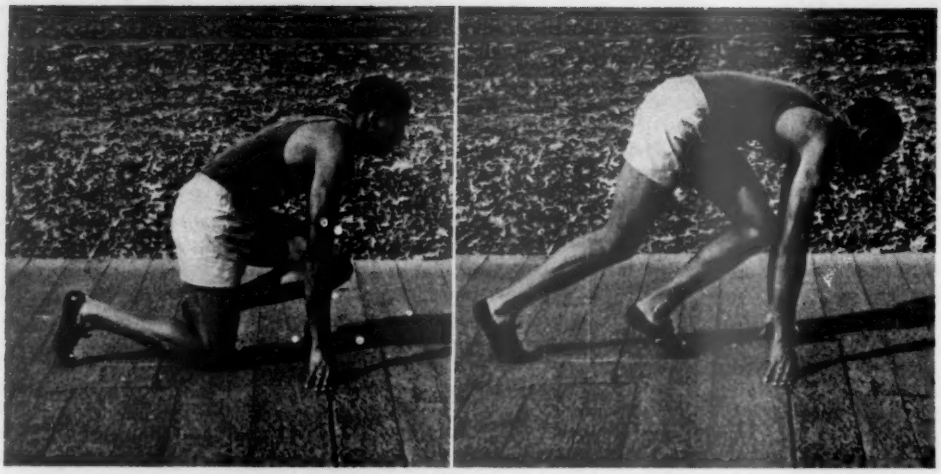
I believe that many coaches, and I have been one of them, have felt that if a runner could hit a given time for 330 yards we had accomplished our mission. This might still be true, but with our desire for smoothness and still a desire for speed I believe that we might add an occasional 380 or 400. I believe that if it does nothing else it will give the boys greater confidence in their ability to go all the way. Payton Jordan in his most interesting and informative talk last week mentioned that he never ran his half-milers this exact distance in practice. I am in full accord and simply wish to add that I feel the same way about our 440 men.

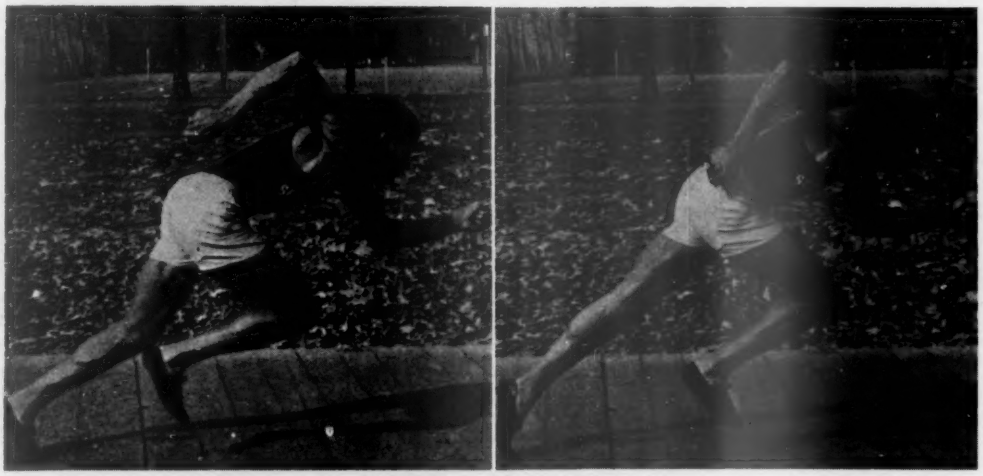
While my remarks up until now clearly indicate that I am an under distance coach, I would like to hedge just a bit. To begin with, I feel that the average youngster without at least two years of experience cannot follow the plan outlined. He without question needs overdistance work for neither his legs nor his body as a whole will stand up to a real heavy program of speed work.

We must also consider the mental outlook of the individual. Some worry about their ability to finish a quarter and whether it be fast or slow they must get in an occasional overdistance workout. Lou Jones was a case in point. Every week during the indoor season, while preparing for the 600 and 440, he ran a three-quarters; it was never fast, in fact it was slow, but he had to do it or he would worry all week about his ability to finish. It might be in point here to say that Lou's problem was never distance; it was speed. As proof, he ran the half twice while at Manhattan, without any advance preparation, and once was just over 1:53 and the other time was very close to 1:52.

Finally, I want to stress that while I advocate underdistance work, I do not believe that this work should be done at top speed except upon rare occasions. It must be done at a pace to be determined by the athlete and his work based upon his age, experience and ability. No runner could stand up under the type of workouts I have mentioned doing each and every phase of his daily work at top speed.







ANDY STANFIELD

A SURVEY ON CONDITIONING TECHNIQUES FOR THE 440 YARD - 400 METER RUNS

by: Stan Huntsman
Ohio University

Sixty-two (62) coaches (62 per cent) and 60 (74 per cent) of the runners responded. The average times for the best quarter miler that the coaches had coached and the runners themselves were 47.8 seconds and 47.6 seconds respectively.

1. The Significance of Speed Workouts as related to off-season, early-season, mid-season and late-season:

	off-season	early-season	mid-season	late-season
Respondees who advocate it	47	79	117	113
Respondees who do not advocate it	58	38	2	6

2. The Significance of Over Distance Workouts in the respective seasons:

	off-season	early-season	mid-season	late-season
Respondees who advocate it	101	113	90	49
Respondees who do not advocate it	6	5	21	70

3. The Significance of Time Trials in these seasons:

	off-season	early-season	mid-season	late-season
Respondees who advocate them	17	62	85	66
Respondees who do not advocate them	97	51	24	53

Time trial distances used in early and mid-season:

EARLY-SEASON

Distances	Advocaters
220 yards	19
300-330 yards	18
440 yards	25
600-660 yards	19

MID-SEASON

Distances	Advocaters
100-110 yards	12
200-220 yards	27
300-330 yards	43
400-440 yards	17
600-660 yards	28

(Time trials in mid-season were used twice a week by those advocating them)

4. The Significance of Interval Running in the four seasons:

	off-season	early-season	mid-season	late-season
Respondees who advocate it	62	106	115	115
Respondees who do not advocate it	52	13	4	4

Interval running distances as used in respective seasons:

OFF-SEASON

Distances	Advocaters
110 yards	21
220 yards	34
330 yards	22
440 yards	24
600-660 yards	17

EARLY-SEASON

Distances	Advocaters
100-110 yards	28
150 yards	19
220 yards	63
300-330 yards	51
400-440 yards	29
600-660 yards	37

MID-SEASON

Distances	Advocaters
100-110 yards	75
220 yards	91
300-330 yards	87
400-440 yards	35
600-660 yards	47

TRENDS IN LATE-SEASON INTERVAL RUNNING

How Differ	Number who advocate change
Run distances faster	47
Shorter rest intervals	16
Shorter distances run	42
Not as much Interval Running	18

BREAKDOWN OF SPECIFIC INTERVAL RUNNING DISTANCES OF MID-SEASON

100-110 Yards (as used in Interval Running - 75 advocaters)

Was used at the following rates of speed:

Full speed	47 advocaters
Pace speed (7/8 or 5/6 speed)	18 advocaters
Below pace speed	10 advocaters

Number of runs (no significant difference as related to different paces used)

Number of Runs	Advocaters
2	6
3	9
4	13
5	16
6	18
7	9
8	16
9	2
10	12

Length of rest intervals

3 minutes	40 advocaters
5 minutes	27 advocaters
All others	8 advocaters

How rest between runs

Walk	34 advocaters
Jog	19 advocaters
Walk and Jog	17 advocaters

Weekdays used: Monday - 10 advocaters, Tuesday - 40 advocaters, Wednesday - 23 advocaters, Thursday - 33 advocaters and Friday - 11 advocaters.

220 Yards (as used in Interval Running - 91 advocaters)

Was used at the following rates of speed:

Full speed	23 advocaters
Pace speed	49 advocaters
Below pace speed	19 advocaters

Number of Runs:

At full speed

3 runs	13 advocaters

At pace speed

3 runs	14 advocaters
4 runs	18 advocaters
5 runs	12 advocaters
6 runs	13 advocaters

Length of rest intervals:

At pace speed

2 minutes	10 advocaters
3 minutes	14 advocaters
4 minutes	11 advocaters
5 minutes	13 advocaters
Complete recovery	12 advocaters

How rest between runs

Walk	35 advocaters
Jog	28 advocaters
Walk and Jog	16 advocaters

Weekdays used: Monday - 21 advocaters, Tuesday - 39 advocaters, Wednesday - 34 advocaters, Thursday - 23 advocaters and Friday - 5 advocaters. (One-third of these respondees used these distances twice a week).

300-330 Yard Distances (as used in Interval Running)

Was used at the following rates of speed:

Full speed	43 advocaters
Pace speed	26 advocaters
Below pace speed	21 advocaters

Number of runs used

2 runs	37 advocaters
3 runs	44 advocaters
4 runs	24 advocaters

Length of rest interval

5 minutes	35 advocaters
Unlimited time	29 advocaters
Others	28 advocaters

How rest during rest interval

Walk	38 advocaters
Jog	20 advocaters
Walk and Jog	20 advocaters

Weekdays used: Monday - 26 advocaters, Tuesday - 27 advocaters, Wednesday - 46 advocaters, Thursday - 10 advocaters and Friday - 5 advocaters.

440 Yard Distance (as used in Interval Running - 35 advocaters)

Was used at the following rates of speed:

Full speed	4 advocaters
Pace speed	11 advocaters
Below pace speed	35 advocaters

Three runs of this distance were most commonly used.

Rest interval was of no significance except that it started with 5 minutes and went up to unlimited intervals.

Walking as a recovery mechanism received twice as many votes as did any of the other procedures.

This distance was advocated by 18 respondees on Monday and 15 on Wednesday and was used only once per week.

600-660 Yard Distance (as used in Interval Running - 47 advocaters)

Was used at the following rates of speed:

Full speed	17 advocaters
Pace speed	15 advocaters
Below pace speed	15 advocaters

Number of Runs

2 runs	41 advocaters

Length of rest interval

8 - 20 minutes (no continuity noticed)

How rest

Walk	25 advocaters
Jog	10 advocaters
Jog and Walk	11 advocaters

Weekdays used: Monday - 29 advocaters, Tuesday - 15 advocaters, Wednesday - 14 advocaters.

Days that the distances were used

Monday	600-660 yards and 440 yards
Tuesday	100-110 yards and 220 yards
Wednesday	300-330 yards
Thursday	100-110 yards
Friday	Not used

The runners that responded had an average time of 9.8 for the 100 yards and 1:56 for the half mile.

THE 400 METERS DASH

By Herb McKenley
Jamaica, B. W. I.

A well built house must have certain requirements of foundation: a medical student must be thoroughly acquainted with the basic subjects for medicine - chemistry, physics - and so must an athlete adhere to certain basic requirements if he must be a good track man. These basic rules are required in most track events and for the purpose of this talk they will be applied to the 400 meters. They are not necessarily in the order of their importance, but if a 400 meter man were to adhere to these, the chances are he will be a pretty fair quarter-miler. Here they are:

1. General Conditioning - the legs in particular
2. Judgment of Pace
3. Complete Confidence - to produce
4. Relaxation
5. Speed - and the distribution of
6. Racing Procedure

I will deal with each aspect in the order I have just named. Conditioning is perhaps the one phase that is basic to every sport - whether it be track, football, tennis or what-have-you. It is a must and in the case of track and field, particularly the 400 meters, conditioning of the legs is a prime requisite. I am sure that it is not necessary for me to tell you what conditioning entails, but I would like to emphasize that a coach should be quite sure that the legs of any of his athletes are in superb condition before he tries to put him in a gruelling race. A well conditioned pair of legs will help a great deal in lessening your fears regarding pull-muscles. As you all know muscles are pulled either from too little warm-up, tiredness - due to overwork, or lack of conditioning. While we can govern the first two fairly well, it is hard to govern the lack of conditioning once the boy is out on the track. It has been my experience that if the legs are not in proper shape, regardless of how much "guts" the athlete may have he just won't be able to lift those legs when exhaustion or fatigue sets in. On the other hand a sound and well conditioned pair of legs will carry him as far as he wants to go. In other words even if he does feel tired he can "talk" himself into going a little further because he has no trouble in lifting his legs. So you will understand that I cannot emphasize too strongly the importance of a well conditioned pair of legs.

Judgment of Pace - This phase of running the 400 meters or for that matter most any other event is most important. Unless the athlete can run his own race - in other words have a good judgment of pace- he will run into trouble every time. It is most essential that an athlete should know the pace of the race and have an approximate idea of what his time will be. It is important because if he finds himself in a race where the early pace is either too fast or too slow for him and he attempts to follow, the chances are he would either, in one case not be able to finish very well or he may even find himself forced to drop out; or in the case where the pace is too slow, he finds himself feeling quite fresh at the end of the race, but because the early pace was too slow for the type of speed he has, the rest of the field had run away from him. I'll give you an idea of what I mean. In 1943 I won the National Junior 400 Meter Run in 47.7 seconds, and qualified to run in the Senior Championships the following day. The defending champion in the 400 meters apparently figured me to be a definite threat to his title aspirations and feeling that I was inexperienced decided to set a trap for me; his running mate whose name I can't recall at the moment, but who was primarily a 220 yards man was also entered in the 400 meters and was one of the finalists. He gave certain instructions of which I was of course, ignorant until about 300 yards from the start. At the crack of the pistol he was off and I was right beside him; he gave no sign of cracking and kept the terrific pace up until midway of the turn when suddenly he stopped running - too late I realized what had happened and had no recourse but to continue - by then I was having a tough time lifting those legs and four other boys swept past me about 40 yards from home. The winner's time was 47.7; my time was nearer 50 than 49. I'll give another instance where bad judgment of pace played a big hand in my defeat. At the Big Ten Indoor Championships at Champaign in 1947 I was the anchor man on the University of Illinois mile relay team and Mal Whitfield was the anchor man for Ohio State University. Whitfield enjoyed a fifteen to twenty yard lead on me on the last leg and although he started out at a pretty good clip he was not trying to break any world's record. On the other hand I felt that if I did not catch him in a hurry we could never win the relay and so I took after him for all I was worth. I caught Mal before we had covered 220 yards but before I could get around to passing him he accelerated, and I in turn was forced to keep up this terrific pace I had started; the result was, exhaustion soon set in and Whitfield won by almost the same margin he started with. So you will see that had I fully understood what judgment of pace meant I could perhaps

have won both these races; I certainly would have performed better. By 1952 I had run into several similar cases and had learned my lesson well and so when Charlie Moore took off approximately 13 yards ahead of me on the third leg in the 1600 meter relay at the Olympic Games at Helsinki, I will not attempt to tell you that I was not worried. I was more than worried - but at the same time I knew that if I must gain on him I must ignore Charlie for a while and concentrate on myself. The words of my former coach at the University of Illinois came back to me when I had asked him "How is it that Mal had run away from me in the relay when I had beaten him in the open race?" His reply was "Herb, you ate up that yardage too fast and he just dragged you out. Don't be in a hurry, if it ever happens again." Most of you here either saw or read of the race, so I won't go into it, but what I am trying to show you is that the result of any race can be quite different if the athlete has a good knowledge of pace.

Here I come to the point that has to deal more with psychology than actual coaching or training methods and that is the confidence that an athlete must have in himself. He must be fearless in his approach - not cocky or conceited - but he must feel, and quite rightly so, that if the basic rules are adhered to and he knows thathis physical condition is of the best then he can produce whatever he is asked to. He must be talked into believing that he is the greatest. Again I must refer to my former track coach, Leo Johnson. When I entered the University of Illinois in 1946 there was nothing to indicate that I would even run 47 seconds - to say nothing of breaking the world's record. It is true that I won the National Senior Championships in 1945, but what was the time? - 48.4 seconds, what any good high school boy can do today. But Leo talked me into it. Almost religiously he kept telling me "Herb, you can be the greatest quarter-miler in the world if you want to be." At first I smiled and wondered why he was telling me all these nice things when there was no need to. But after a while I began to believe it and started to train like one. When the Big Ten Indoor Championships came around I ran the quarter mile 3/10ths of a second faster than I had won the Senior Championships the year before on a track half the size of the one I had run on outdoors. I immediately began to feel that perhaps Leo was right, and could see something which was beyond me, and at the Penn Relays that year - 1946 - I was timed in 46.9 on my leg of the relay. By this time, my "confidence to produce" was always high, and the Monday before the Big Ten Championships, Leo told me I was now ready to break the world's record. His actual words to me were, "You will break the world's record on Saturday, Herb; take it easy for the rest of the week." Well it is now history - that on June 2, 1946 on a rain-soaked track I ran 46.2 seconds - breaking the world's record, which at that time stood at 46.4. After that I could run 46 and a fraction almost every time I stepped on the track, because I knew that I had prepared well and felt that nothing could stop me from running a good time.

As I mentioned, the athlete must have confidence in his ability, and this confidence should help to induce relaxation which is always an important factor in the 400 meters run. Why is it so important? Because the 400 meters is a step beyond a sprint and you and I know that the human body cannot sustain a maximum sprint effort much beyond 150 yards. You can therefore see quite clearly that no athlete can attain maximum performance whether it be 50 seconds, 49 seconds or a world's record performance unless he is completely relaxed throughout the race. Bear this in mind that no matter how good his performance might be it would have been a much better one were he relaxed during his run. A spur of the moment impression might lead one to believe that a relaxed runner cannot have top performance; this is a fallacy. You must bear with me if I use examples of myself as an illustration to any point but you will appreciate that most of my knowledge on this event has come from personal experiences. I would like to illustrate the difference that one has a certain amount of tension and the other is completely relaxed throughout. My best recorded time for the 220 yards is 20 and 4/10ths seconds. Yet I have been able to run 20 and 8/10ths seconds on the way to a quarter mile and was able to finish quite strongly. I refer particularly to the quarter mile at the National Collegiate Championships at Salt Lake City in 1947. In that particular race I realized that I must carry a pretty fair first 220 yards if I was to win; I drew the inside lane and Dave Boland of Colorado was in lane 2. Using Dave as a guide I figured that I must cut the distance of the stagger in half if I am to run my prescribed time of 21 seconds at the 220 mark. I did 2/10ths of a second better and went on to win in 46.2 seconds which also broke the official world record of 46.4 seconds. There is only a difference of 4/10ths of a second between my best 220 and this one. It is therefore obvious that this 220 on the way to the quarter mile must be regarded as a full effort and it is only through relaxation that one is able to produce a relatively good effort on top of an already maximum performance.

How can one master this so important a phase in track and field? Only by constant practice, and by practice I mean by telling himself over and over again, "relax, relax, relax". To illustrate my point - What do you do when you want to move your hand? Your brain sends a message and up the hand goes. So therefore, you must use these sensuous impulses to control the muscles that play such an important part in running.

When one speaks or hears of a world record performance, the first thing that comes to mind is "Speed". Speed plays an important part in almost every movement of our daily lives; there is the speed of the boxer of the ring, the speed of the aeroplane through the sound barrier, the speed of the Shot Putter

across the circle and so forth and so on. So speed must be an important factor - if not the most - in any foot race.

The quarter mile has been described as a long 220, and judging from some of the times that have been recorded recently this race belongs in the sprint group rather than the middle distance. Any boy who believes he can sit back until the last 50 or 60 yards to turn on the heat and so win a race is quite mistaken. Running the 440 yards entails a full effort from gun to tape and those who are unable to generate sufficient early speed will be left by the wayside. Speed can only be attained or increased by constant practice and a 400 meter man cannot do too much speed work. In fact speed is his ultimate aim. It therefore cannot be taken too lightly and I recommend that some type of speed work should be done at least three days of the week. In order to give the athlete every chance to attain the maximum speed his starting position must always be a comfortable one. If he is comfortable on his mark he will be able to concentrate on the starting command and once he is able to do that he can give his undivided attention to getting out of the blocks. Those first couple of steps are all important and once this is mastered he is much on his way to generating all the speed that his legs can carry. The athlete should not only have the necessary speed but he should know just how to control it, otherwise great speed can be a disadvantage rather than an advantage.

During the early years of my sub 47 seconds performance - in fact as late as 1948 - I did not quite fully understand just how to control my speed, and I believe that my inability to control this speed has a direct bearing on my loss of the Olympic 400 meters title. It has been said by many that my first 200 meters was fast - nothing of the kind - I have run faster 200 meters and yet was able to finish stronger and in better times. Examples are 20.8 at Salt Lake City in 1947; 20.9 at the American National Championships in 1948 and on June 5, 1948 the occasion when I ran 46 flat, my first 220 was 21.2. All these times are at least as fast as my first 200 meters at the Olympic Games in 1948. But, to come back to the question of uncontrolled speed. I remember quite clearly as if it happened yesterday. I was determined to run about 45.6 and set about it quite calmly; I knew exactly what I had to do. The pistol fired and we were off. I was in lane 2 and when I reached the 200 meters mark I had passed Morris Currotta of Australia who was on the outside lane. I knew I must have been running well since Currotta's running is patterned something after mine, and feeling more relaxed and less fatigued than any other time I could remember, I decided to keep up the same effort without any thought of relaxing my shoulders and arms. I felt almost as good at the 300 meter mark and decided then to go into my "kick", the result was about 40 or 50 meters from "home" the roof fell in, as it were, and all I could do was to hold on as best I could. This is not intended as an alibi nor to detract from Arthur Wint's magnificent performance, but I do feel that with a little better distribution of speed I not only would have finished better, but would definitely have run a faster time although I might not have won.

An ideal distribution of speed then would be a fast action from the blocks for about 50 or 60 meters, then with a slight lowering of the arms the athlete goes into a smooth rhythmic action to the half way mark and then between the 200 and 300 meters mark he takes - for the want of a better term - a rest. At the 300 meter mark he starts to prepare himself for the run home. This must be a gradual effort; he should never jump suddenly into his drive because the sudden tensed action will hasten fatigue. He should then be in his full run at about 60 meters from home. That way he will be able to increase his speed with every stride.

It is generally accepted that there are two types of 400 meter runners - "Sprinter Type and the Half Miler Type" - or as has been suggested by one writer, the "McKenley Method" and the "Wint Method". There is nothing wrong with the method of either type; it is for the coach to decide the method that is best suited to a particular athlete. World record holders have been produced from both types; Ben Eastman, Grover Klemmer, Rudolph Harbig and Arthur Wint - all former world record holders or Olympic Champions of this distance are the half mile type 400 meter men. In the sprinter type there are such men as George Rhoden, Hubie Kearns, Lou Jones, Ollie Matson, Bill Carr, Jim Lea and of course, myself. As the name implies, the sprinter type must possess more than average speed so that he can use this speed in the early stages of the race to advantage without any undue effort. In other words with an economy of effort. The one thing that either type must do - He must get out of those blocks as fast as his legs can carry him because the race can be easily lost before the 50 meter mark is reached.

The Sprinter Type 400 meter man should be able to carry his early speed much further than the half miler type and so he invariably builds up an early lead for himself. While it is true that the half miler is able to finish much stronger or with much more of a rush than the sprinter, the lead that he gained over the early stages quite often is good enough to take him home first.

I will now deal with the general technique in running the 400 meters. As I said earlier you should begin fast - in fact for a split second you must be of the mind that you are in a 100 meter race. This fast action should be kept up to at least 60 yards in the case of the half miler and up to 100 yards in the case of

the sprinter type. At this point the athlete swings into a smooth and rhythmic action - he does this by a slight lowering of the arms. And here is something that is important - he must be taught that in a race of this nature the high knee lift action is not recommended. He should be taught the hip movement where the feet are never more than a few inches from the ground from one stride to the other. The reason for this is, he is able to relax more with the hip movement; it takes less effort and he does not spend as much time in the air. He then keeps this action to the half-way mark. I must also make it clear that this smooth and rhythmic action does not mean that he must slow down to attain this. Actually the relaxation that he has developed by this is helping him to do his work with an economy of effort. If ever he slows down he should do it between the 200 and the 300 meter mark but so slightly that it can hardly be noticed by the average onlooker. At the 300 meter mark he prepares himself for the drive home. He gradually lifts his arms being careful not to lift his shoulders. Again I am emphasizing that he should never jump suddenly from one action to another, because this produces sudden tension which causes a tying up process and fatigue. By this he is about 60 meters from home and is in his full drive for the tape. At the finish he should be tired but never to the point where he would be an easy prey for an onrushing opponent.

Although I have told you about general conditioning and its importance, I have not said anything about training. Training is not very practical on paper, it is a very hard thing to do as I know you will appreciate. Hard and fast training schedules cannot apply to every athlete, because they react differently to any one type of workout.

I will however attempt to give you a general idea of what a training time table should be like over a period of about three months.

The first thing of course, is the conditioning period, which should last about 4 weeks, where the boy can do easy running over hills and dales. This should not be less than 2 miles at any one period or more than 5 miles. During this period he should do a fair amount of deep breathing, abdominal exercises and if he is a frail looking boy with thin shoulders, then exercising with light weights is also permissible, but the coach must be careful that this should not continue after about 4-6 weeks and the weights should always be quite light. The danger here is that he may develop hard muscles which do not induce relaxation.

Soon after this, interval running is recommended, preferably the full 440 with the stop watch as a guide. Two things can be gained from this - he develops a certain amount of stamina and he also learns "pace" at the same time. The coach instructs his charge to run a 60 second 440 and he knows exactly how much effort it took to produce 60 seconds, and this is repeated until his condition improves. Interval running should not be limited to 440 only, but should include the sprints because in the 440 the emphasis must be on speed. The interval running goes on for another three weeks by which time the coach can concentrate on starts, fast sprints, etc.

HOW WE COACH THE MIDDLE DISTANCE RUNNERS

By Payton Jordan
Stanford University

WORLD 800-METER RECORD
First 400-meters: 52.0s; Second 400-meters: 53.7s -- 1m 45.7s
Roger Moens (Belgium), Oslo, Norway, August 3, 1955.

WORLD 880-YARD RECORD
Each 220-yards: 25.5s; 26.1s (51.6s); 27.7s; 28.2s (55.9s) -- 1m 47.5s
Lonnie V. Spurrier (United States) Berkeley, California, March 26, 1955.

WORLD 1500-METER RECORD
Each 400-meters: 56.9s; 58.8s; 61.5s; Last 300-meters: 43.6s -- 3m 40.8s
Sandor Iharos (Hungary); Helsinki, Finland, July 28, 1955. Record tied by Laszlo Tabori (Hungary) and Gunnar Nielsen (Denmark), Oslo, Norway, September 6, 1955.

WORLD ONE-MILE RECORD
Each 440-yards: 58.5s; 60.2s (1m 58.7s); 58.6s; 60.7s (1m 59.3s) -- 3m 58.0s
John Landy (Australia) Turku, Finland, June 21, 1954.

HOW WE CONDITION OUR MIDDLE DISTANCE RUNNERS

We begin our middle distance fall and off-season preparation-development program by impressing on the minds of our runners the vital factors that have brought and will continue to bring, the best possible results in this, one of the most exacting tests in track competition. These are:

1. An ever active willingness to work hard to develop one's middle distance running potential to the highest possible degree.
2. Stamina, to a degree of having more endurance than is necessary, a condition that gives ease and comfort to one's running.
3. Effortless, rhythmic striding.
4. Speed, to a degree of having more than enough to set world records in every event from 800-meters to one mile.
5. A true sense of pacing so as to be able to know each pre-competition and competitive day what one is capable of doing. This knowledge enables the runner to determine in advance of a race the lap times to run and gives him confidence to stick to that plan in spite of what the other runners do.
6. An absolute faith in one's ability to do his developed best at all times and under all competitive conditions.

During October and November, we give careful attention to the development of stamina and speed reserve and to good general upper body development through pull-ups, push-ups and stomach exercise in adequate proportions so as to attain the much needed overall body development.

We pay particular attention to form which, although not as important as stamina and speed, must be developed through practice so it becomes automatic in actual competition. We stress striding with loose, relaxed hip action without trying to lengthen the stride, as the proper stride is more a matter of individual choice for personal comfort. The stride most comfortable and efficient for the runner is the one we adopt.

We use the ball-heel landing with a slight lifting of the toe just before touching the ground, in order to lessen the jar to the muscles of the leg. From this position, great leverage for the forward driving action takes place.

We encourage running in bare feet on soft surfaces, as found on golf courses, in order to cushion the landing while running and give freedom and development to the small muscles of the feet.

The body lean is more upright in the middle distances than in the sprints and all movement is

directed to driving the runner forward with the greatest efficiency and economy. We allow a high kick-up behind for it is more efficient mechanically and allows greater freedom and relaxation of stride.

Arm action is an individual thing and comfort is more important than style. We do coach that upper arm movement is the most important aspect of our action and stress is made to gain the feeling that the point of the elbow is carrying a light weight and doing the pumping action and, at the same time, the shoulder swing is kept at a minimum. Variation in arm swing position is advocated so as to encourage relaxation under maximum action while running. The change takes place, to the greatest degree, from the elbow to the hand by lowering or elevating the lower arm as it swings. The important consideration of arm carry is freedom of swing and to prevent lost motion from flinging arms wildly. It can be seen that arm movements are only important insofar as they compensate for hip and leg action and to promote and aid balance. As in the sprints, we maintain relaxed face, jaw and neck muscles. During this period emphasis is made upon repetition work much more than long, sustained plodding action. We believe that work repeated over distances of shorter duration, develop the two most important training needs of middle distance runners, stamina and speed reserve. In our training, we practice "accelerating" from slow running to full speed striding without losing relaxation and coordination. We aim to develop a pattern that avoids jerkiness so the arms and legs move in harmony so our breathing will adjust to the stride rhythm. At the same time, consideration is given to learning pace. We use such schedules as running consecutive half miles at a reasonable pace for the given ability of the individual or, perhaps, a series of consecutive quarter miles, again adapting to the ability of the athlete. The same thing may be done by use of 220 and 660 yard runs. Too, we run moderate distances three or four times weekly, rather than less frequent runs of longer distances. All this running is interspersed with occasional bursts of speed or, in other words, mixing breezing and fast work together, for it is our opinion that this increases speed and develops condition rapidly. We would not advocate intensive heavy training day after day but, rather, it is our feeling that greater development and learning takes place when we work hard every other day. We work for specific results, of course, but our training methods are kept flexible so as to best meet the individual needs of our athletes.

Early Regular Training Season Work

With the foundation for this phase of training well laid during the fall training period for middle distance runners, we now become more specific in our workout schedule. Even though the 880 (800m) and mile (1500m) run are closely associated, there are a few variancies in form and technique that must be considered. Let us take the two together, however, and merely point out differences as they arise. In both we consider form, start, body of race, finish, racing techniques and pace. For both races the one point probably most important, assuming basic stamina and speed reserve are present, would be pace. We will take the above mentioned points in order, discussing pace at the last. Because style or form is important to efficiency and coordination, our attention is directed so as to perfect harmony of action between the leg, trunk, arm and neck muscles and the respiratory and circulatory actions. Our training program aims to mechanically correct all phases of our running action. We coach our boys in the 880 to be higher on the ball of their foot and in the mile to be a little further back on the ball of their foot. We want the body to be more upright as the race gets longer, and we strive for more relaxation as the race increases in distance. The arm action is lower, less vigorous and adapted to individual ease as the distance of the race lengthens. In the middle distance races, we like the stride somewhat shorter and knee lift lower than in the sprints. We often advocate overstriding in practice so as to develop greater foot reaction from the ground and bring about more efficient use of the hips. To develop freedom and smoothness of the hip action in their middle distance runs, we often use a small stick about the size of a pencil and 12 inches long, holding each end of the stick in the hands so as to control the use of the arm action and emphasize the use of the hips while striding. We have the athletes look from 10 to 12 yards ahead of the spot he is running to aid in establishing helpful balance and body lean for the rest of the body. We develop breathing by taking full regular breaths through the mouth and nose. In middle distance races, the relations between stride and breathing becomes especially important, for the body must have oxygen to continue its efficiency.

Training the 880-Yard, 800-Meter, Mile and 1500-Meter Runners

The prescription or work plan we follow is partially an individual proposition and we allow for latitude in training methods. We approach our training with the physiological and psychological point of view, from the warm-up to the core of our program. Through warm-up we bring the systems of the body

and the mind to a point of adjustment necessary for strenuous exercise and to give the athlete a feeling of confidence needed for productive work.

We work with the athlete to determine adaptations to be made in the training schedule according to individual condition and capabilities. Pre-competitive training is started between four (4) to six (6) weeks prior to first scheduled competitive effort.

For the boys that lack stamina, an over-distance workout such as five (5) laps and repeat half miles are given. We prefer, however, under-distance on a repeat distance to over-distance during the in-season training periods. If our man is lacking in speed it is indicated that he needs to work with the shorter races on a repeat basis such as the 220's, 330's and 440's. A most effective method of conditioning, developing a speed reserve and stamina, is the running of "in and out" 220's, 440's and 880's in which the athlete runs a fast 220 yards, 440 yards or 880 yards at a pace dependent upon need; a 220 before repeating at a similar pace. Whether the man is a freshman or a senior, we always emphasize the development of pace judgment. Another formula to which we adhere is to run for a period of time rather than a given distance in a workout. For example, we feature continuous running for 15 minutes with 50 to 60 yard spurts numerous time enroute. It is common practice for us to use 440 yard repeat runs with three to five minutes rest between each and the number of these repeats is based upon the ability, condition and needs of the runner. It is our philosophy that much is to be gained by working runners together rather than singly. Our beginners are requested to stay on the track under more rigid supervision than are our more experienced veterans as they condition, learn pace and running strategy and tactics. The more experienced boys are encouraged to run on the stadium grass turf and golf course once or twice a week.

Above everything else, we believe in a varied training program. We particularly recommend the use of speed on a dual basis, one to develop stamina and two, to increase basic speed and, in so doing, the program should embody repeat runs over short 50-60 yard distances and brief spurts at intervals during steady striding and 330 fast strides, on a sprint basis, at repeated intervals.

Basic training schedules for the middle distance runs are presented for use, mindful of individual differences requiring adjustments. Too, the workout schedules include the 660 and 1320, as well as the 880 and mile runs, since all of these are generally found in the high school program.

660 YARDS--FEBRUARY WORK-OUT SCHEDULE

Monday

1. 10-15 minutes exercise and warm-ups.
2. Run five laps... check running form... inhale for three strides, exhale for three strides, maintain this rate of breathing for first two laps.
   - 1st week - Breeze 2-1/2 laps.
   - 2nd week - Breeze 3-1/2 laps.
   - 3rd week - Breeze 4-1/2 laps.
3. Train down.

Tuesday

1. 10-15 minutes exercise and warm-ups with squad.
2. Run a 330 at a 45 second pace, stride the last 110 yards. Check your time with a manager or coach.
3. Rest until breathing is normal, then run two easy laps.
4. Take four trips on the lane lines... 100 yards each.
5. Train down.

Wednesday

1. 10-15 minutes exercise and warm-ups with squad.
2. Stride through a 60 second 440, walk a lap, stride a 220.
3. Rest until breathing is normal, then run an easy lap and a half.
4. Take four trips on the lane lines... 100 yards each.
5. Train down.

Thursday

1. 10-15 minutes exercise and warm-ups with squad.
2. Run two laps of windsprints as follows: Start at the middle of the track with an easy run; as you come off the first curve, build up speed gradually so you have reached your maximum sprint speed at the middle of the straight-a-way, now ease off until you have reduced your speed to any easy, relaxing run as you go into the second curve. Maintain this run until you come off the curve and then build up to top sprint speed by the time you have reached the middle of the straight-a-way. Now gradually reduce speed so you will be at a slow relaxing run as you go into the first curve again. Walk a lap then repeat one more lap of windsprints. Walk a lap.
3. Conclude by running one easy lap. Take four trips on the lane lines... 100 yards each.
4. Train down.

Friday

1. 10-15 minutes exercise and warm-ups with squad.
2. Stride a 58 second 440, rest at least 10 minutes.
3. Stride through a 220 at about 29 seconds.
4. Walk a lap, run an easy lap. Report for relay practice.
5. Train down.

Note: ALWAYS WATCH YOUR RUNNING FORM. HEAD STRAIGHT AHEAD... BACK STRAIGHT, SLIGHT FORWARD LEAN AND NOT TENSE... ARMS, SHOULDERS, HANDS RELAXED AND SWINGING EASY WITH RUNNING RHYTHM... CONCENTRATE ON HIGH KNEE ACTION. DON"T LET FEET TRAIL BEHIND, BUT BRING THEM THRU QUICK WITH HEELS JUST CLEARING BUTTOCKS... DON'T TOE OUT.

660 YARDS--MARCH WORK-OUT SCHEDULE

Monday

1. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice.
3. Stride one lap, run two easy laps, stride one lap.
4. Rest, thnn run the lanelines. Relay practice.
5. Train down.

Tuesday

1. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice. Four starts for 30 yards.
3. Take three laps of wind sprints. Breeze corners, sprint the straight-a-ways. After a rest, run an easy lap.
4. Train down.

Wednesday

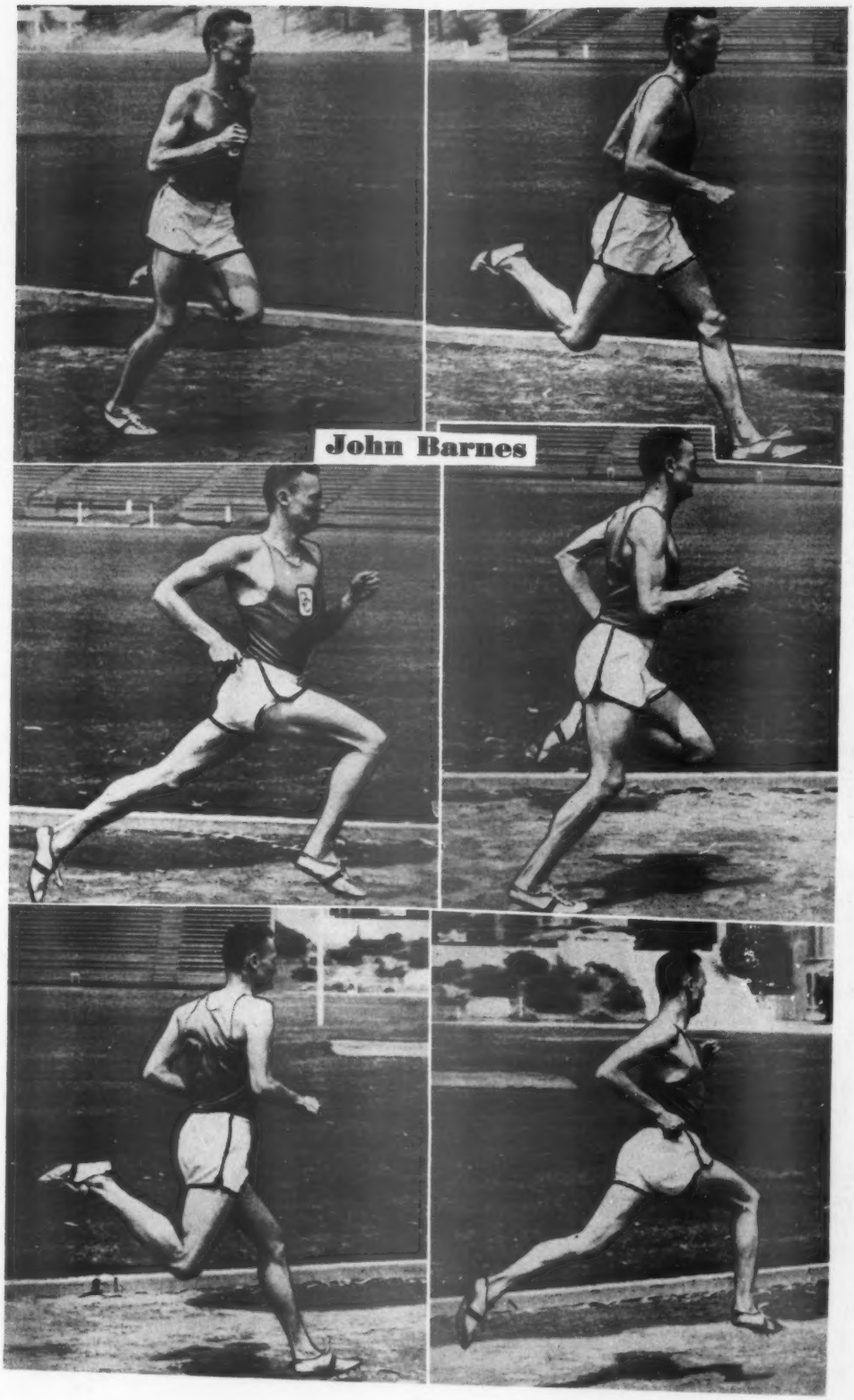
1. 10 minutes exercise with squad, run one lap.
2. Report for starting block practice, four starts at 30 yards.
3. Stride through a 58 second 440. Rest. Run an easy lap.
4. Relay practice.

Thursday

1. Rest, if a track meet is schedule for Friday.
2. 10 minutes exercise with squad. Run one lap.
3. Report for starting block practice. Four starts for 40 yards.
4. After resting, stride through a strong 58 second 440. Keep steady stride.

Friday

1. Rest, if a track meet is scheduled for Saturday.
2. If no track meet is scheduled for Friday or Saturday, follow this work-out for today.
3. 10 minutes exercise with squad, run one lap.
4. Run your race and go all out for time. Use the dirt track. Check your time with a manager


John Barnes

or coach.

HINTS TO REMEMBER:
Are you relaxed in the shoulders? arms? hands? hips?
Are you keeping your knees high and bringing the heels thru under buttocks as soon as you drive off the toes?
Are you carrying your head level? Looking straight ahead? Keeping toes pointed straight ahead?
Are you asking for criticism? Checking your teammates?
Are you improving your running form and the strength of the team?

660 YARDS--APRIL, MAY WORK-OUT SCHEDULE

Monday

1. 10 minutes of exercise with squad. Run one lap.
2. Report for starting block practice. Three starts for 30 yards.
3. Five laps as follows: Run easy 1, stride 1, run easy 1, stride 1, run easy 1. After first two laps, striding may be confined to straight-a-ways and corners or curves may be breezed.

Tuesday

1. 10 minutes of exercise with squad. Run one lap.
2. Run a 440 for time as follows: (a) sprint from start to first curve. (b) go into a 3/4 speed stride to end of first curve. (c) at beginning of back stretch straight-a-way, gradually build up speed so you are striding at 7/8 full speed as you come into the second curve and maintain all the way around curve. (d) start final sprint as you swing off the second curve onto the homestretch straight-a-way. Check your time with a manager or coach. Rest until breathing is normal.
3. Stride an easy (but don't loaf) 220.

Wednesday

1. 10 minutes exercise with the squad. Jog a lap.
2. Report for starting block practice. 40 yard sprints (three times).
3. Stride a 58s 440. Use even stride all the way, no change in stride.
4. Take two laps of windsprints, walk the curves.

Thursday

1. Rest, if a track meet is scheduled for Friday.
2. 10 minute exercise with squad, run a lap. Take three windsprints.
3. Stride a 58s 440. Use no change in stride. Rest.
4. Run a 42 second 330.

Friday

1. Rest, if a track meet is scheduled for Saturday.
2. If no track meet is scheduled for Friday or Saturday, follow the instructions below for a work-out.
3. 10 minutes exercise with the squad. Run one lap.
4. Run your race and go all out for time. Use the dirt track and check your time with the manager or coach.

TO REMEMBER:
1. Swing from the hips easily, just as you swing in the shoulders.
2. Practice a high knee lift and a piston-like drive from the knee to toe.

880 YARDS--FEBRUARY WORK-OUT SCHEDULE

Monday

1. Warm-up. 10-15 minutes exercise with the squad. Run an easy lap.
2. Follow the 660 work-out for Monday.
3. Train down.

Tuesday

1. Warm-up. 10-15 minutes exercise with squad. Run an easy lap.
2. Run a 440 at a 65 second pace. Rest, then stride a 220.
3. Rest until breathing is normal, then run two laps. Take four trips on the lane lines... 100 yards each.
4. Train down.

Wednesday

1. Warm-up. 10-15 minutes exercise with squad. Run an easy lap.
2. Stride a 440 at a 65 second pace, then continue from the finish line with an easy run to the 220. Rest.
3. Run two easy laps. Take four trips on the lane lines for 220 yards.
4. Train down.

Thursday

1. Warm-up. 10-15 minutes exercise with squad. Run an easy lap.
2. Follow same work-out as that which is indicated for 660.
3. Train down.

Friday

1. Warm-up. 10-15 minutes exercise with squad. Run an easy lap.
2. Stride through a 440 at a 65 second pace, rest at least 10 minutes.
3. Stride through a 220 at about a 30 second pace. Walk a lap.
4. Report for relay practice.
5. Train down.

TO REMEMBER:

Head straight ahead. Back straight with a very slight forward lean, but not stiff. Arms, shoulders, hands relaxed and swinging easy with running rhythm. Concentrate on relaxed hip action - don't let feet trail behind, but bring them through quick with heels just clearing below buttocks. Don't toe out.

880 YARDS--MARCH WORK-OUT SCHEDULE

Monday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice.
3. Run four laps as follows: Stride one lap, breeze two laps, stride one lap.
4. Rest, then run the lane lines. (four trips at 100 yards).
5. Relay practice.
6. Train down.

Tuesday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice. Four starts for 30 yards.
3. Stride a 63 second quarter mile, keep a steady stride and pace at all times.
4. Rest until breathing is normal then run an easy lap.
5. Repeat number 3, 4 and 3.
6. Train down.

Wednesday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice. Four starts for 30 yards.
3. Take three laps of wind sprints. Breeze corners, sprint straight-a-ways. After a rest, run an easy lap.
4. Relay practice.
5. Train down.

Thursday

1. Rest, if a track meet is scheduled for Friday.

2. Warm-up. 10 minutes exercise with squad. Run an easy lap.
3. Report for starting block practice. Four starts for 40 yards.
4. After rest, stride thru a 63 second quarter mile. Rest.
5. Stride thru a 30 second 220. Rest. Run an easy lap.
6. Relay practice.
7. Train down.

Friday

1. Rest, if a track meet is scheduled for Saturday.
2. If no track meet is scheduled for Friday or Saturday, follow this work-out for today.
3. 10 minutes exercise with squad. Run an easy lap.
4. Run your race and go all out for time. Use the dirt track. Check your time with a manager or coach.

POINTS TO REMEMBER:
Are you relaxed in the shoulders? arms? hands? hips?
Are you keeping your hips relaxed and bringing the heels thru under the buttocks as soon as you drive off of toes?
Are you carrying your head level? Looking straight ahead about 8 yards? Keeping toes straight ahead?
Are you asking for criticism? Checking your teammates? Are you improving your running form and strength?

880 YARDS--APRIL, MAY WORK-OUT SCHEDULE

Monday

1. Warm-up. 10 minutes exercise with the squad. Run one lap.
2. Report for starting block practice. Three starts for 30 yards.
3. Two 140 yards with high knee lifts.
4. Breeze one lap, stride one lap at hard pace, breeze one lap, walk one lap, then repeat.
5. Train down.

Tuesday

1. Warm-up. 10 minutes exercise with squad, run one lap.
2. Run a 660 as follows: 1st lap, stride for 60 second quarter and maintain same stride for another 220, total time: 1:35.
3. Two 330's for time.
4. Rest, then stride two snappy wheeling 220's with high knee lifts last 30 yards.
5. Train down.

Wednesday

1. Warm-up. 10 minutes exercise with squad, run one lap.
2. Report for starting block practice. Four starts for 40 yards.
3. Six 220's at a relaxed fast pace on an in and out basis.
4. Run a 58 second 440. Rest. Take three laps of wind-sprints, sprinting straight-a-ways and walking curves.
5. Train down.

Thursday

1. Rest if a track meet is scheduled for Friday
2. Warm-up. 10 minutes exercise with squad, run one lap.
3. Take three starts for 30 yards. Rest.
4. Run a 60 second 440, rest 10 minutes, then repeat.
5. After complete recovery, breeze an easy 440.
6. Train down.

Friday

1. Rest, if a track meet is scheduled for Saturday.
2. Warm-up. 10 minutes exercise with squad, breeze one lap.
3. Run your race and go all out for time. Use the dirt track and check your time with the

ANALYSIS OF WHITFIELD'S RUNNING FORM

Captions by Larry Snyder

NO. 2: Fine technique—body angle forward, forearms at right angle to upper arms and hung loosely so elbows ride close to body, full extension of driving leg.

NO. 3: Left foot ready to meet track. Foot has swung forward and is now swinging back toward him as it should. A relaxed forward knee accomplishes desired result.

NO. 4: Initial contact with track will be made by outer edge of ball of lead foot. Heel is lower than in sprinting, but doesn't make contact with track.

NO. 5: Note forward inclination of body with pushing leg, body, and head in straight driving line. Mal is getting all of power from rear leg by this full extension.

NO. 6: Position of forward leg with foot so close to track is typical picture of Mal putting on the brakes—so that he will not over-run leader.

NO. 7: Rear foot (kick-up) is definitely part of Mal's relaxed style. Though no coach would teach it, little or nothing can be done about it when it's there. Arms are again at right angle. Many distance men carry hands lower, but Mal is using normal middle-distance arm action.

manager or coach.

TO REMEMBER

1. Swing from the hips easily, just like you swing your shoulders.
2. Work on that important hip-swing and piston-like drive from hip to toe.
3. Keep those feet pointed straight ahead and drive off of them.

1320 AND MILE--FEBRUARY WORK-OUT SCHEDULE

Monday

1. Warm-up. 10-15 minutes exercise with squad. Run an easy lap.
2. First week, run 2-1/2 laps... check running form... inhale for two strides, exhale for three strides, maintain for two laps. (Pace work).
3. Second week, same as above but add a lap (3-1/2 laps).
4. Third week, same as above but add 1-1/2 laps (5 laps).
5. Rest, then run the lane lines. (three trips for 150 yards).
6. Train down.

Tuesday

1. Warm-up. 10-15 minutes exercise with squad. Run an easy lap.
2. Stride a 440 at a 70 second pace. Take three of these with a five minute rest period between each 440.
3. Six 220's easy swinging, high knee lifts last 30 yards.
4. Take four trips on the lane lines for 150 yards each.
5. Train down.

Wednesday

1. Warm-up. 10-15 minutes of exercise with squad. Run an easy lap.
2. Stride a 880 at a 70 second pace. Rest, breeze an easy lap.
3. Six 440's at 3/4 speed or at mile pace.
4. Four 110's on "in and out" basis.
5. Train down.

Thursday

1. Warm-up.
2. Six 220's a little faster than mile pace.
3. Three 110's, power running.
4. Train down

Friday

If you have a meet Saturday, come out and do just two laps of easy running followed by train down work.

If you do not have a meet Saturday, take the following work-out.

1. Warm-up.
2. One 1320 for time.
3. Two 220's at full speed.
4. Train down.

Day after meet: Take some easy wind-sprints and fast striding, followed by limbering-up exercises and easy running.

POINTS TO REMEMBER:

1. Head straight ahead, look down track 10-12 yards.
2. Back straight with a very slight forward lean, but not stiff.
3. Arms, shoulders, hands relaxed and swinging easy with running rhythm.
4. Concentrate on relaxed leg and hip action, don't let feet trail behind but bring them thru with heels just clearing below buttocks.
5. Don't toe out.

1320 AND MILE--MARCH WORK-OUT SCHEDULE

Monday

1. Warm-up. 10 minutes of exercise with squad. Run an easy lap.
2. Take six consecutive laps as follows: Stride one at hard pace, breeze two, stride one at hard pace, breeze two. Rest.
3. Run the lane lines for foot position four times over distance of 150 yards.
4. Four 110's, power running.
5. Train down.

Tuesday

1. Warm-up. Ten minutes exercise with squad. Run an easy lap.
2. Report for starting block practice, four starts for 30 yards.
3. Stride two 880's in 2m 16s (68 seconds per lap). Rest.
4. Four 110's in and out.
5. After the end of the 1st week in March, drop #3 work, stride a 68 second 440 following the rest period in #3.
6. Train down.

Wednesday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice. Four starts for 30 yards.
3. Complete three laps of wind sprints. Swing corners and sprint straight-a-ways. After a rest, run an easy lap.
4. Report for relay practice.
5. Train down.

Thursday

1. Rest, if a track meet is scheduled for Friday.
2. Warm-up. 10 minutes exercise with squad. Run an easy lap.
3. Report for starting block practice. Four starts for 40 yards.
4. Four 110's on "in and out" basis.
5. After a rest, stride a 66 second 440. Rest 10 minutes. Repeat at a 60 second pace.
6. Two 220's, power running.
7. Train down.

Friday

1. Rest, if a track meet is scheduled for Saturday.
2. If no track meet is scheduled for Friday or Saturday, follow this work-out for today.
3. Warm-up. 10 minutes exercise with squad, run one lap.
4. Run your race and go all out for time, use the dirt track and check your time with a manager or coach.

TO REMEMBER:

Are you relaxed in the shoulders? arms? hands? hips?
Are you keeping your hips free and bringing the heels thru under the buttocks as soon as you drive off the toes?
Are you carrying your head level? Looking straight ahead 10-12 yards?
Are you asking for criticism? Checking your teammates?
Are you improving your running form and strength?

1320 AND MILE--APRIL, MAY WORK-OUT SCHEDULE

Monday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice. Three starts for 30 yards.
3. Take seven consecutive laps as follows: Stride one on pace, breeze two, stride one on pace, breeze two, stride one on pace. Rest.
4. Run three 330's on "in and out" basis.

5. Train down.

Tuesday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Run 2-1/2 laps as follows: 1st lap in 67 seconds, 2nd lap in 66 seconds, last 220 in 33 seconds (2:47.0). Rest and repeat.
3. Three 110's on "in and out" basis.
4. Two 220's, power running.
5. Train down.

Wednesday

1. Warm-up. 10 minutes exercise with squad. Run an easy lap.
2. Report for starting block practice, four starts out 40 yards.
3. Two 440's at race pace.
4. Run an 880 as follows: 1st lap 68 seconds, 2nd lap 70 seconds (2:18).
5. Six 220's at a little faster than mile pace.
6. Take two laps of wind sprints. Sprint straight-a-ways and walk the curves. Rest.
7. Stride a 70 second 440.
8. Train down.

Thursday

1. Rest, if a track meet is scheduled for Friday.
2. Warm-up. 10 minutes of exercise with squad. Run an easy lap.
3. Take three starts for 30 yards.
4. Run or stride a 66 second 440, rest 10 minutes and then repeat. Rest.
5. Swing an easy 440.

Friday

1. Rest, if a track meet is scheduled for Saturday.
2. Warm-up. 10 minutes exercise with squad. Run an easy lap.
3. If no meet is scheduled for Friday or Saturday, run your race and go all out for time, use the dirt track and check your time with a manager or coach.

TO REMEMBER:

1. Swing from the hips easily, just like you swing your shoulders.
2. Work on that important relaxation.
3. Keep those feet pointed straight ahead and drive off of them.

HOW WE COACH THE HALF MILER

Our half milers are schooled to run a pace that, at the finish, finds the athlete has used his maximumsupply of energy. We work for definite strategy which calls for the first lap to be between two to three seconds faster than the second 440. Practice against running self out and lagging more than six yards behind opponents is a part of our training. Our strategy will generally put the runner near the inner curb and we usually don't pass on curves unless near end of race. We indoctrinate the athlete to arrive at the first curve among the first three men, with the lead, if possible. The boys are urged to develop the habit of running in front. We encourage the use of the crouch start position and our blocks are set on a tangent (angle) to the pole lane at the curve, regardless of the distance from the start to the first turn. We desire our 880 men to use an acceleration for about 20 yards at the start of the second 440 and 660 yard posts to maintain, increase, or gain better position and time. Our emphasis lies in having our boys regard their half mile pace in 220 parts, not merely 440's. For passing opponents, our boy's thinking is geared to gather himself and make a complete and surprise burst and, while in the lead position, he is taught to anticipate a move to pass by a trailing runner and accelerate with him to keep him behind and outside. We have an inflexible rule for the last turn into the final straight-a-way: we try to hold or gain the pole and never swing away from thepole lane as we lean a little further forward, come up on toes, shrugging the shoulders and working the arms more vigorously. At the finish, emphasis is made to relax face, jaw, lower arms and shoulders while accentuating hip swing and dropping knee lift to increase stride and, consequently, speed.

TRAINING FOR THE 1500 METER (OR MILE) RUN

by: Bill Bowerman
University of Oregon

It is with a great deal of humility that I approach the task of discussing the 1500 meters or the mile run for this group of track coaches from all over the United States and from foreign countries. I am certain that there are in this assembly people who are better qualified to discourse on the mile run than am I. However, if one wants to make a silk purse the first thing one must have is some silk. It has been my good fortune during the past several years to have the kind of material that produces outstanding middle distance runners. I include in this group, Jim Bailey, who is presently in his junior year at the University of Oregon; Jack Hutchins, who ran several years ago; Bill Dellinger, who runs either the mile or the two mile (and I should say 1500 meters or the 5000 meters); and Ken Reiser, who ran the mile, the two mile and the steeplechase.

I am reasonably certain that the training methods that we have used with these young men are very similar to the training methods that are presently used by many of the coaches here in the United States, and it includes the material that we have borrowed from such outstanding coaches as Gosta Holmer, Franz Stampfl, and the British coaches headed by Geoffrey Dyson.

I shall deal with generalities first. To me there are three essential things that a miler should either be born with or that he should work to acquire. These three things include: (1) Endurance, a certain amount which he must be endowed with. (2) Pace judgment; this is something that some athletes seem to fall into with a great deal of ease and other spend a great deal of time acquiring. (3) Speed; it would be very nice if all milers had a great deal of speed. I think that it is possible for a miler or 1500 meter-man to increase his speed and toward that end we spend some time working. I think of the three essentials for a miler, speed is the least important.

In discussing the three essential things for a distance man, I shall start first with conditioning. I am reasonably certain that the track and field coaches here in America feel as I do, that the young man who wishes to enjoy success must spend the better part of the year in preparing himself for the short track season we have in the United States. In other words, when he enters school in the fall, he will begin his conditioning. Our conditioning in the fall has two purposes. The first, of course, is for some cross country competition, which is a rather minor activity at our University. Second, is building the foundation for the track season which will start competitively in the Pacific Northwest about the first of April. Most important part of our conditioning activity is fartlek. I describe this briefly as we do it and I am sure everyone here has read dissertations on it by many of the outstanding coaches in the world. We do all of our fartlek activity either on the grass on the University of Oregon campus, or our runners go to one of the three golf courses, which are fairly close to the small city of Eugene. Our fartlek activity includes the striding at an easy pace until some fatigue begins to set in and then easy slow jogging until recuperated. The other activities that are included are speedwork for 50 to as far as 300 yards, depending upon when fatigue begins to hit the runner. Striding and challenging an imaginary runner, striding and meeting the challenge of an imaginary runner, striding and throwing in a break in cadence such as five to ten fairly rapid short strides. We start out with a run of about five minutes; as the conditioning period progresses, we add five or ten minutes to each session until our runners can handle up to one hour. We think the important parts of this activity are first of all not getting fatigued, and second, that the runner have that feeling of exhilaration described by Mr. Holmer at the end of the workout activity. To me this is the most important part of our training. One other thing that I might say about the endurance activity is that we believe that there is a physiological reason for having one hard day's work followed by a light day's work. This is true of our conditioning, our pace, and also our speed work. We then plan our work to have a hard practice on Monday, Wednesday, Friday, and light work on Tuesday, Thursday, Saturday, and Sunday. This is during the conditioning period of the practice. This, of course, must be varied when competition begins. The second activity in training for the mile is that of pace judgment. I don't believe any runner could go out and run 440 if he has not had considerable experience with it and tell how fast he has run. We therefore start each new year with the idea that no runner knows how fast he is running. In other words, every man is a beginner. To that end, we run 110 yards over and over during the early part of the conditioning period, and we plan on running it at a pace that the competitor will use when he goes into the cross country season. In other words, if a man is going to try to hit an 80 second quarter over a four mile course, he will run 110 yards in 20 seconds. We, therefore, in the pace judgement work have the man run 110 yards in as near 20 seconds as he can hit, he will shag 110 yards, and repeat at

the start of the next 110 yards. Some competitors pick up this knack very quickly and others spend the entire season or maybe two seasons learning how to judge their pace. If I were planning on running a man a four minute mile, to use a comparison with our twenty second 110, I would use the 15 second 110 inasmuch as four times fifteen is sixty and four times sixty is four minutes. When the ability to judge 110 yards is acquired, then we move on to 220 and finally to 440. When a man is in excellent condition, we sometimes run as far as half mile and very rarely a three quarter mile.

The third element of the mile run is speed. I think we would generally agree that sprinters have native ability towards speed and endurance men have native ability towards endurance. Therefore it would seem that some work should be spent on speed. My experience has been that speed is very important and that one should attempt to use it as an endurance as well as a speed activity. I think it is also important that a miler do his speedwork not from the blocks but rather from moving into it. I suggest this inasmuch as it is possible for a miler to pull a muscle just as certainly as it is possible for a sprinter to pull a muscle.

The activities that we use in the speedwork include 55 yard dashes and we do them in this manner. We sprint 55, we shag 55, we sprint 55, etc. I think that most endurance men will have the same experience that ours have had and that the quarter mile is a pretty heavy go with that kind of activity. When they get so they can do a half mile of that, they are in extremely good condition. The second type of activity is windsprints, which I am sure most people use. We do them down the side of the track in the grass, and we plan on a workout to include as much as eight laps windsprinting each side, shagging the turns and as few as four laps. We have a third sprint activity that we use occasionally and we call it a continuation relay. We use this not only as a sprint activity, but also as a pace activity. A continuation relay finds four men to a relay team, either half milers, milers or two milers, and lined up directly across from each other so that they run a 220, pass to a teammate who runs a 220; he passes to the number three man and so on. They pass the baton until they have had from two to eight 220's at a selected pace such as 25 to 30 seconds, depending on how strenuous they want to make it.

I would next like to devote myself to planning a race according to the ability of a competitor. Might I say before I begin discussing the plan of the race, I am rather cautious in deciding how fast a young man can run until I am quite familiar with his abilities. I sometimes get a reasonable estimate of what a young man's capabilities are in one season. On the other hand, I know that in some cases it has taken me three years to find out how fast or how a young man can pace himself. I think I agree with John Landy when he says that he believes the second half of the race should be faster. I have held that opinion for some time and I think the reason for this is that I have a great deal of respect for that physiological condition that is called oxygen debt.

The best example of oxygen debt is an example of a mile run by high school boys, or seventeen year olds. I am sure many of you have observed a mile when the competitors take off and run a race in the first lap being 62 seconds, the second lap probably 72 to 75 seconds, third lap 90 seconds, and the final lap in whatever the competitors can muster. I have seen many miles like this and the results are over 5 minutes. We assume that no boy can run under five minutes until he has proven he can do so. We, therefore, start with the idea of running 110 in 18 seconds. We give a margin of error of up or down one second. In other words the trainee might run 17 seconds or he might run 19 seconds. When he has mastered this, we shove him out to 220 yards then we would like to have him run 37 seconds with a margin of error of one second running 36 or 38. Finally, we get him out to 75 seconds for a full quarter, and we give him a margin of error for the beginner of two seconds up or down. When the trainee is successful at this, we start in on our repeat quarters, as I call them, and I believe they have been described as interval training by a great many track coaches. We think that a young many should be able to run a minimum of ten quarters at a pace that he can handle. When he can handle ten of them, we then set out to shove the distance up to a half mile with the ability to run at least the full distance with repeated half miles and not more than two and half times the distance. When he can handle this, then we say now we are going to make as assault on the five minute mile and because of that great bogey "oxygen debt", our preference would be that the margin of error be upward on the first half. In other words, the first half mile would be run in as much as two thirty-four, then he would pick up the pace on the third lap where most of the competitors like to rest. He would drop down to 73 seconds in the third lap and give it all he had on the last lap. If he breaks the five minute mile by a good margin, then we will start planning for a faster race in the next competition. We look at the energy that a miler has to expend, like the money in the bank that you or I might have to live on for a month. For example, if I have $100.00 to live on for four weeks, if I spent $50.00 for the first week, I'm going to get pretty hungry in the fourth week. I am sure that the runner who runs a 60 second first lap is either going to run the four minute mile or he is going to be extremely exhausted when he starts in on the second half.

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2 JERRY KARVER

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Training and competition schedules are something that deserve a great deal more than passing attention. We use a general training schedule as made for all milers and I suppose it includes principles and practices that are outlined by such authorities as Bresnahan, Tuttle, and Cretzmeyer or Doherty or any of the many others who have given sample training schedules in their excellent textbooks. It also includes material from the old master Gosta Holmer and his fartlek activities and also the excellent practices that have been used so successfully by the English runners in their "interval" or repeat type running activity. To prepare a training schedule for one month I lay out a period from one through thirty-one to include the longest month that we might be in training and block out not only the days, but also a space for eight or ten checks. On the extreme right of the practice schedule, I then list what I call the fundamentals of the event and I number these from one through the total number of activities that I think are fundamental for a miler. These would include: (1) The warmup run and exercises. To explain what I mean by that, and this would not appear on the workout sheet, a warmup run is one anywhere from a half to as much as four miles of fartlek type of activity. This is followed by exercises for flexibility and for strength. By strength exercises I mean exercises not only for the legs, but also for the arms and for the upper body. I think it is extremely important for a runner to have good arm strength and shoulder strength so that he does not tire. (2) Pace 110's. These 110's might vary in pace from as much as twenty seconds to as low as fifteen. The twenty seconds is for a cross country type pace or for the beginner, the fifteen second pace would be for a runner with the capabilities of a Bailey or a Dellinger. (3) Pace 220's (4) Pace 440's (5) Pace 880's (6) Pace three quarters (7) Windsprints. To explain windsprints, if I have not already covered it satisfactorily in talking of speedwork, these are on the grass down the straightaway and are run almost wide open with a shag around the corner and a repeat down the other straightaway for a total from four to eight laps. (8) Pace relays. This is a play speed activity and also some element of pace in it. The object of the activity is to give the individual not only some pacework, but also some race activity with a little bit of the element of fun and competition thrown in with it. (9) Trials. Trials might be half the race distance or three quarters of the race distance. I have never believed in running full distances except in actual competition. The question might be raised where does one get the endurance work, and again I will say that I think one of the most important bits of training is in the fartlek type activity when we get our endurance and over distance. (10) Runout. We believe every type of fundamental should be concluded with a coolout or runout with the exception of the fartlek which is a sort of workout and runout at the same time. The reason for this is that the accumulation of lactic acids and body wastes should be "moved" after a hard workout. This is true of not only the training, but also the competition. So at the windup of every day we like to have our athletes take a "runout" to conclude all of their activities.

With the days and the spaces for planning the workouts prepared, we block out what we hope to accomplish. In doing this, I again refer to one of the first principles and that is for every hard day, we think there should be a recuperation period of one day. So if we start on a first of the month planning a workout, it might include the following check. (1) for a warmup (2) 110's of pace and check the fartlek type of activities to conclude. The second day would be light work with nothing strenuous. The next training day would include more of the fundamentals and, of course, I think this is up to the coach to make his own plans. We block out an entire month and plan our schedules to alternate hard and light until we get into competitive season. When the competitive season arrives we plan on doing our heaviest work the early part of the week, gradually tapering off with usually light or no activity before the competition.

If we have an individual who needs a special training schedule, either because we know his peculiarities from one or more seasons' experience with him, or possibly because he has had a pulled muscle or a bad cold, we prepare a special training schedule. This training schedule of course includes the same fundamentals as the general schedule. The only thing is that it is geared for the individual. I, of course, have used a special training schedule for Jim Bailey, and also Bill Dellinger, after the competitive season arrived. I don't think any training schedule can be followed absolutely to the letter. There are certain circumstances that make it necessary to deviate. For example, if a man looks or feels tired, I think that the plan must be varied, or perhaps it may be departed from completely.

An advantage of the planned workout schedule is that the athlete knows in advance what he is going to do. He can not only look one or two days ahead, but he can look a month ahead. It also has the advantage of a reference for the coach. With these training schedules on file, I can look back not only to what Dellinger did a year ago or what Bailey did a year ago, but to what Peter Mundle did six years ago. It's a nice thing to know where athlete A stands in relation to athlete X of several seasons past.

To conclude with my thoughts on training schedules, I offer an excerpt from my notes on Brian Hewson. An example of his fall and winter training (this was told to me by Ken Reiser who visited with

him during his trip to the continent and through England) included a great deal of interval type work. For Example:

Monday	10 x 440	70
Tuesday	5 x 880	2:20
Wednesday	3 x 1320	3:35 - 3:40
Thursday	10 x 440	70
Friday	1 hr. fartlek	
Saturday	10 x 440	70
Sunday	5 x 880	2:20

Further on an example from Hewson, and this is during his competitive season in May:

Monday	10 x 440	60
Tuesday	5 x 880	2 min.
Wednesday	3 x 1320	3:09
Thursday	Light fartlek	
Friday	220's	
Saturday	Competition	

In conclusion, may I summarize as follows. It is a fortunate coach who has athletes of the abilities of Bailey, Dellinger, Seamon, a Hewson as the material to work with. The three necessities for the miler; (1) endurance, acquired through fartlek type of activities (2) pace judgment acquired through repeat quarters or interval running (3) Speed, acquired through windsprints and also through the fartlek type of activity. It is of utmost importance that the athlete have a plan for his work through the year. The coach is merely a guide to the athlete and helps him with the plan that he must execute. This plan must include not only the fundamentals that are so necessary for any track and field event, but also must keep in mind the competitive season.

* *

(Editor's Note) Mr. Bowerman went into some detail in describing his "workout board" a sample of which is reproduced on the following page. The underlying idea is that workouts for a whole week or even a month are laid out in advance for the athlete to see and use.

(Question) Is this all Bailey does in workouts? It seems to be about one-fourth of what Kuts does. Mr. Bowerman answered that he prepared special schedules for Bailey and Dellinger but that this was substantially the amount of work done. Several of the foreign coaches commented on how easy the work was compared to the workouts of the prominent European runners.

(Question) How many 110's do you work on the grass on Mondays? (Answer) About twenty. Remember, these aren't done on the Monday before the meet. This is in the week before that.

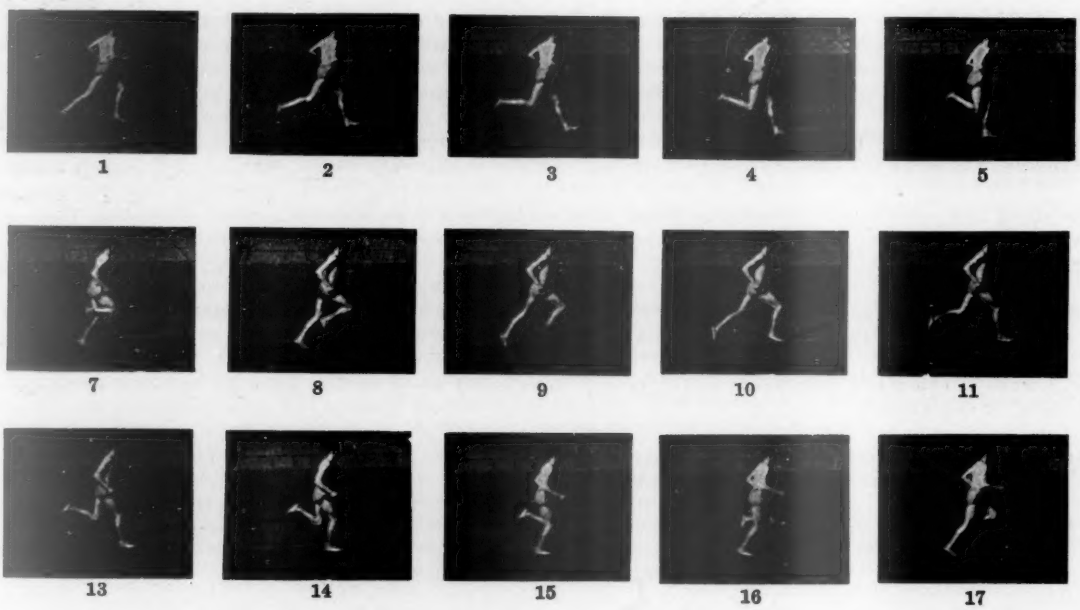
(Question) Do you find that working on grass affects judgment of pace on the track? (Answer) The grass is a little slower but other factors, particularly avoidance of injury, shin splints, etc., make up for that.

(Question) Is 220 yards the shortest distance American runners use for pace? (Answer) We use from 55 yards up to a half mile. Our windsprints are 110 yards, four to five laps.

Mr. Rompotti remarked that Iharos and Kuts will do as many as 60 sprints from 100 to 400 meters, 20 100's, 10 400's, etc.

(Question) What is your cross country distance? (Answer) We start at two miles then increase one mile every two weeks. Our last race is at six miles.

Running in early stages of 10,000-meters grind are (l. to r.) Zatopek, Czechoslovakia, winner in Olympic record time; Mimoun, France; Pirie, Great Britain; Perry, Australia; Anoufriev, USSR; Sando, Great Britain; Posti, Finland; Stokken, Norway; Rashid, Pakistan.



GUNDER HÄGG

LONG DISTANCE RUNNING

by: Gosta Hòlmer
Sweden

I have the honor to talk about long distance running, and most of you expect me to talk about Fartlek and interval training. I am certainly going to mention these training methods, which are only a factor of the problematic equation that is called rational running training, and which in itself holds other factors, on which the interval training is based.

Technique and training have made great advances in the last ten years, and you are tempted to ask this question about running: "In what way do the methods of today differ from the methods of the old stars?"

My opinion is that what we today call Fartlek and interval running, was part of the training of a Shrubb and a Nurmi. Nurmi made repeat runs of 200 and 1500m while Shrubb ran repeated 2 miles. When the Swedish runners of 1930 and 1940 made their world times, the method of repeat running was organized into Fartlek. The real interval running had as its pioneer Rudolf Harbig, Germany.

We could not help but notice, that from year to year the demand for better performances, new records, was made by the managers. It is a certain way for them to earn more money, and the athletes and their coaches have worked hard at complying with this demand. One tried therefore to find out how a Nurmi, a Harbig and the Swedish runners were training. One started to make comparisons and to seek the reason why they trained as they did. One sought assistance from SCIENCE, thus one had both feet on the ground. The development of today has been possible only thanks to good collaboration between science and the coaches.

To make you, gentlemen, fully understand my effort to give an account of rational training, I want to tell you right away, that the road to world records is not only interval training, which is only 20-25% of a year's training, but this training is, according to my ideas, far more comprehensive. And when I divide a year's training into different periods, they are decided by the climate of my country and by our competition season. But there should be no great difficulties to adjust this training to your country.

We have a PREPARATORY TIME from about the middle of December to the end of March, a SPRING SEASON during which we have cross country running first and then go on with the track training, a period in all of 2 months. In the beginning of June the period starts which has the COMPETITION SEASON in view. Our training follows the rhythm of nature, the laws of nature, with its seasons autumn, winter, spring, and summer. We don't, because of that, approve of indoor competitions that we consider disturbing for the rational benefit of condition.

When coaching a runner we must understand that it is important among other things to GIVE HIM A GOOD TECHNIQUE AND THE ABILITY TO USE IT IN THE RIGHT WAY.

TECHNIQUE: Let me first talk about the technique and the training that is necessary in order to learn it right and to be able to use it in a manner economical to running and economical in the sense of power. Our first problem is: What powers cause the running? We can divide them into two principal parts.

PART 1	PART 2
1. The function of the internal powers	2. The function of the exterior powers
a) Muscle contraction.	a) Gravity
b) The heart, the lungs, and the function of the internal organs. We can call all these the Human Motor	b) Air resistance c) The friction and the reaction of the earth.

The exterior powers control to a certain degree the technique. Gravity shows itself to the runner for instance this way: After the push-power has ceased to work, gravity takes over and the runner again gets contact with the earth. The air resistance affects the direction of the push-power. The greater the

speed, the greater the air resistance and the more pointed the direction of the push-power. This should not be mixed up with the inclination of the body which broadly speaking remains the same. The effect of the push-power is due to the amount of the friction. In sprinting you need more friction than in long distance running, and because the friction in these cases is the same as the shoe spikes, a sprinter must have longer spikes than a long distance runner. A marathon runner can get along fine without spikes-- the pressure and the uneven surface are sufficient for the runner to fully use the very little push-power.

The leg power has 2 main purposes: (a) To prevent the runner from falling to the ground. (b) To push the runner forward in the direction of the running.

1. If the foot hits the ground in front of the center of gravity, the "reaction" of the leg will work in a direction that acts like braking on the movement of the running direction.

2. If the foot hits the ground right under the center of gravity, this resistance is eliminated, and the leg power that in both cases is used to prevent the body from falling, gains a direction upwards, that is not braking the movement forward.

3. If the foot hits the ground somewhat behind the gravity center, the leg power has a double task. The resistance power must then, due to a quick interference, give the body an upward push, that prevents the runner from falling at the same time as it pushes him forward. We have examples of this technique with sprinters in their 3-4 first steps after the start.

To the eye this seems as if the step of the runner should be short with quick leg movements. The contact of the foot to the ground is very short, as is the following float time. To succeed with this leg technique it is necessary to approach with the leg, like a jumper approaches to get a quicker "take-off." When this approach is made with the leg, the knee is swung forward-upwards then to fall and also to be pushed to the ground. During this movement, the forward swinging movement of the underleg is caught when the leg is almost straight. The foot actually will be beating the ground. The longer the step, the higher the knee lift, and accordingly, quicker approach and "take off." We know this technique from sprinting. The other extreme is the marathon with very little approach and very little knee swinging.

The leg movement must have a fixed rhythm with no moment of rest. The leg is swung backwards and forwards like a driving wheel in a clock, and during the movement backwards, the foot hits the ground and gives the runner a push forwards in the running direction. This leg technique is of great importance as it saves power and thus increases the runner's endurance.

The arms work with the movement of the legs. The technique should be that the movements of the arms work around the body, not from it. Every athlete should work his arms in a manner least troublesome to him.

The body should be held in the same position during the step and in a position right above the center of gravity (erect trunk).

THE PHYSICAL TRAINING: To be able to do the right movements, the muscle strength must be developed in the right way in order to hold strength to do the movement during the time in question. At the same time the antagonists of the movement must be trained in a manner that they, through complete relaxation, make the least possible resistance against the movements. Only you don't give these qualities to the muscles through running training. Walking in rough country, weight lifting, resistance movements under knee lift -- In Sweden and also in Russia we do walking and running in snow during winter and we also train indoors with an India rubber tub as resistance in the knee lifts. But you must not forget the muscles of the body. If the leg power is not forwarded by the body, it shows a lack of power, and we see the result in the wrong carriage of the body. The effect of the leg-push then becomes a reduced step. Imagine two footballs, one lightly pumped, the other hard. The lightly pumped ball resembles a well developed musculation. If you should kick these balls just as hard, the well pumped one will go much farther than the other one.

I have discussed these problems longer than may be usual, but the reason is, that many athletes, training intensely, ignore these details -- injuries appear that may ruin the athlete for a long time, sometimes forever. I should like to compare this training to the trimming of a racing car. The runner's body is his anatomical construction, his engine is his heart, his lungs and his circulatory system. No motor minded person would place a V8 engine into an old Ford car and then enter for competition. Thus no

GUNDER HÄGG, ARNE ANDERSSON och ARNE AHLSEN.

Gösse Holmér

OLLE ÅBERG och STRAND

ERIK AHLDEN,

4.04,6	Gunder Hägg, Sverige	1942
4.04,6	Rune Gustafsson, Sverige	1943
4.04,6	Lennart Strand, Sverige	1945
4.04,2	S. Wooderson, England	1945
4.03,8	Rune Persson, Sverige	1945
4.02,6	Arne Andersson, Sverige	1943
4.02,6	Gunder Hägg, Sverige	1944
4.01,6	Arne Andersson, Sverige	1944
4.01,4	Gunder Hägg, Sverige	1945

coach should work only on the internal organs, the human motor, but he must use a system that develops them both and gets as a result a good collaboration between them.

THE TRAINING OF THE INTERNAL ORGANS: When talking about the methods to use in coaching the runner's engine, we must take into account the progress that science has made, findings which can be useful to us. First I want to say that we have reserve power that we never quite use. In our daily life we use about 20% of it, but in training we can use up to 60% more without having to use our will in calling up this reserve power. But to use more of it, the influence of the will is essential. We can through the will use 10% more. The remaining 10% you can use only in case of unexpected, sudden danger. To a certain degree this is connected with the choice of intensity for the different runs. That is decisive for the efficiency of the training. This can be said: ALL RUNNING SHOULD NOT BE DONE WITH THE MAXIMAL POWER BUT ONLY WITH SUCH A SPEED THAT THE IRRITATION WAVES ARE PASSED. The private training work thus reflects one year of training. A permanent increase adds considerably to the runner's reserve power. That is to say that after a long training work there follows an increase of the endurance, and after a quick work, there follows an increase of the quick power and so on.

After an intense training for a long time--many years--the gain in power is almost 10 times greater than at the beginning.

We all know that if you train a detail only once, there is no positive result. More repetition is needed. A shot putter must make put after put, a jumper must make jump after jump and a runner must make run after run. This repetition of practice has been called "interval running." To make these at all, the choice of distance must not be longer and the speed not higher than the athlete can repeat them several times. The repetition runs must be chosen in a manner to develop both the endurance and the speed.

When running short distances in sprinting tempo, the muscle gets used to working without oxygen, and finally learns to suffer this condition of oxygen debt, a consequence of every short, quick work, without any greater difficulty. These repeated irritations will result in much shorter intervals necessary to regain strength, and you have not only gained faster speed but better endurance.

A long distance runner can run his distance with a speed that is equal to the oxygen supply. To increase the ability of the heart and lungs, not only the processes following the training are of great importance, but also those taking place during the run. I mean the collaboration between the breathing system and the internal organs. Only a longer run--a workgoing on for a longer time--can affect this, and that is possible only if the tempo of the work is not TOO QUICK. It is also necessary to proceed with utmost caution to the increase, aiming at a perfection of the heart action. Finally the running becomes easier and the more even the tempo, the longer the time it can go on. You can also call this kind of endurance "general stamina."

This form of training dominates the winter and spring without entirely leaving out running in variable tempos. It is the development of the runner's organs that this kind of training especially promotes.

We know that the flow of blood gives the muscles the power--oxygen in a form of glycogen--that is necessary for the muscle contraction. The richer the bloodstream to the muscle fibres is, the better chances they get to work. But in order to let the blood sort of give the whole muscle fibre a shower, with glycogen, numerous channels are needed. And the ones that are most extreme are the capillaries. Through an even training for a long time they increase, and thus also the runner's endurance. There are examples to prove that training in an even tempo for 1-2 hours every day has even given such a speed, that 10,000 m was run in 29.30.0 and 5000 m in 14.20.0 and the marathon in 2.25.0.

SPECIAL ENDURANCE: The runner's special endurance in long distances is characterized by the balance between the oxygen supply and the oxygen absorption. During such races the oxygen consumption is in balance some minutes after the start, that is, if the runner has not warmed himself before the start. More speed demands more oxygen. The keeping of a steady state depends on the runner's condition in longer distances than the competition one. The better this is, the easier a steady state can be maintained during a high oxygen consumption.

The runner's training must therefore be concentrated in securing a steady state by equivalent changes and improvements of the organ under increased oxygen supply. Repeat runs at a speed faster than the one the runner is using during the whole race, are an effective means in order to increase the

power of the organs.

These repeat runs at a faster speed than the average one of the competition race demands much more from the organs which respond to this demand by an equivalent increase of the power. Thus you can for a long time do a work with less intensity. The repeated training work under higher intensity, made under oxygen debt, cries within the organs for a change and an improvement that guarantees the keeping of steady state.

Before I go on to talk about different training methods, I want to say: The effective training to increase the power of the internal organs depends first of all on the mere running training. But we have to consider two factors that also have a critical influence on the effects of the running training. They are:

A. The recovery period after the work, when the state from before the training returns.

B. The conditioning period takes place when the potentiality for work is increased at the same time as the assimilation process, caused by stimulation of the internal organs during practice. Hereby the losses are levelled at the same time as the potentiality for work is increased above the condition before the onset of training.

Only supposing that the athlete gets the opportunity of having sufficient rest and sleep, will he be able to utilize the more intense training.

TRAINING PROGRAM: This is what a training program would look like, based on the training details how to improve the heart and lungs and the power of the internal organs.

The Winter Training-

1. You start by running in a fixed tempo, for instance 1 km in 4 minutes, and keep on running as long as you can keep this tempo. The increase does not consist of increased tempo but of increased running time. You need more endurance to run 2 km than to run one. By the end of winter the runner should have reached an endurance that enables him to keep the tempo, 1km in 4 min. for 60-75 min.

2. You run slowly, 1km in 5 min. for instance, and you keep this tempo for 45 seconds, then you increase the speed for 1km in 3.00.0 and keep that for 30 sec. You go on with this type of change training until a certain fatigue enters, and at the end of the winter season you should be able to repeat the run of 30 sec. so many times, that you pass the running time of the competition race with about 1-2 min. Repeated and small jobs increase the common effort.

3. Walking. Alternate between competition walking and strolls. 2-3 hours once a week.

The Spring Training-

1. Increase runs on tracks past the competition distance. 10,000 m runners do 10-12 km, 5000m 6-8 km. The first 3/4 (three quarters) of the distance is done in 1/2 speed and the rest in 3/4 speed. The increase is done this way: The distance on which you are using 3/4 speed is increased until you run almost the whole distance in 3/4 speed.

2. Repeat runs of 800m. The tempo is 1/2, increased to 3/4 during the last 3/4 of the distance. Before the pulse beats its normal beat per minute, you repeat the run and you go on until a certain fatigue enters. If your pulse beats 60 beats per minute before the start you should repeat the run when the pulse is 80-90. To fix a certain time for this is not good.

3. Repeat runs of 2500m. First 2 km in 1/2 speed, last 500 m in 3/4 speed. The same principle as in the last method.

The Summer Training-

1. Speed

a. You run a short distance -- 150-300m -- at a speed considerably faster than the average speed of the competition distance. You repeat the run, but not before you feel you have the strength to do the run in the same time as before.

b. You run 400m in a time that is 2-4 sec. under the average speed. If this is 72 sec. the 400 m should now be run in 70-68 sec. and you should repeat the run before your pulse is normal, 80-90 beats instead of 60. You repeat until a certain fatigue enters. When condition gets better, the pulse value is reduced, and the time until the beat is 20-30 above normal gets shorter. The interval time is reduced due to better condition.

2. Endurance

a. Repeat runs of 800-3000m. You run the distance in a tempo 5-15 sec. below the average speed of the competition distance. After the race you trot-run for 10-30 min. For a longer distance you trot for 30 min., for a shorter for 10. The runner ought to get such an endurance, that the runs made touch the length of the competition distance.

b. Divide the competition distance into two distances. Start by running the first half in competition speed, trot for so long time that your pulse beats 80 beats per minute and then run the other half in competition tempo. The increase is done by increasing the first half of the distance until 3/4 of the whole and thus reducing the trot time until it is not more than 2-3 min. Don't think about the pulse.

Control Running- Every tenth day you should control your condition by running on time. If now you have the fancy to compose out of these details a day's training, to be busy with them all, to play with the speed, then you are a free runner, who understands that running demands much, and that only the runner himself is able to use the advice given to him by his coach, and that the coach is only the supervisor. It is this play with the speed, this responsible task of the problem "rational training" that I call "Fartlek", and that believes in the athlete's good sense and self-studies.

To finish off my talk of all training I thus dare to say, that the personal ability is of great importance but not altogether decisive. Great performances are made only through hard and steady work, and this training must be done in inseparable connection with fortifying all the internal organs, especially breathing and circulation. The methods are many, but all have one thing in common, a steady increase until the highest power is reached.

I want to mention another important question. It is said that only training that is done throughout the year gives world record results. I do not share this opinion. When the physiologists say this, they are not logical. They say, that after a hard, daily training work you must have a recovery period. Then you wonder why the same physiological laws should not be followed in the "year round training" the one that the laws of nature, our rhythm of life has dictated through the four seasons.

Of course you must practice some form of body exercise, but the period after the end of the competition season until the training is again started, must not be an active preparation for competitions. In Sweden we have this period from the middle of October to December.

DISTANCE RUNNING AT MERCED HIGH SCHOOL

By Bob Edmister
Merced, California

MERCED HIGH SCHOOL BEARS

DISTANCE RUNNING

We are now training for all races above 440 by the method of Gosta Holmer the Swedish Olympic Coach. His method, called "Fartlek", has been used with great success by some of the world's outstanding runners.

WHAT IS FARTLEK ?

Fartlek in English means "Play of Speed" or "Speed Play". In this system of training the athlete takes a great deal of his training upon himself which should make his training much more real and enjoyable. The idea is to run for a certain length of time at different speeds but averaging specific times for every 100 yards. This is how you should work out after you have exercised and jogged two laps to warm up.

1. Easy running.
2. Steady hard speed.
3. Rapid walking.
4. Easy running broken by wind sprints of 50 to 60 yards.
5. Easy running with six or seven quick steps now and then. This should be like the sudden speeding up you will have to do during a race when fighting off someone who is trying to pass you. Speed up very quickly.
6. Full speed uphill.
7. Very fast running during the last one (1) minute. You should get at least a 440 into the last minute of your workout.

The seven types of running described above should be mixed up and repeated during the course of your daily workout.

We will get our workouts according to time rather than by running any specified number of laps. The average workout should be from one to two hours long. You cannot get a reasonable workout in less than one hour. Each athlete must take it upon himself to see that he builds endurance and speed according to his own ability. If you have natural speed, work on endurance; if you lack speed you should concentrate on that phase of running. It is the man who has well balanced conditioning between speed and endurance who will get the most from his body, who will enjoy running, and who will run his best race.

TECHNIQUES OF TRAINING

The following are some techniques of training which will help you during competition:

1. Train in a group with other distance men. These groups can be mixed classes (A, B, C). Run short races during the workout and help each other gain conditioning.
2. When you are practicing think about what you will do during the workout and in competition. How far you will run, at what pace, how you can fight off a runner who is challenging, how to run on the turns, etc.
3. Run all the different events. This acquaints you with all the events and you will have fun also.
4. Run hard when you feel good and relax a bit by walking when you feel tired.
5. Work on your stride for your particular race.
6. Always finish your days practice with speed work. Run two 100's or one 220 or one 440 depending on how you feel.

TRAINING SCHEDULE

Pre-season:

TRAINING SCHEDULE

Pre-season:

Days	Speed for 100 yards	Time
1	23 sec.	10 min.
4	"	12 min.
7	"	14 min.
10	"	16 min.
13	"	18 min.
16	"	20 min.
19	"	22 min.
22	"	24 min.
25	"	26 min.
28	"	28 min.
31	"	30 min.
34	"	30 min.
37	"	30 min.
40	22 sec.	28 min.
42	21 sec.	26 min.
44	20.5 sec.	24 min.
46	20 sec.	22 min.
48	19.5 sec.	20 min.
50	19 sec.	18 min.
52	18.5 sec.	16 min.
54	18 sec.	14 min.
56	17.5 sec.	12 min.
58	17 sec.	10 min.
60	16 sec.	8 min.

On the days 2, 3, 5, 6, and so on walk 45 minutes and jog 40 minutes with a good 440 to finish.

Early-season:

Monday:

1. Fartlek 45 minutes.
2. Milers run first 440 of race at pace.
   1320 men " 440 "
   880 men " 330 "
   660 men 330 "
   440 men " 220 "
3. Repeat 2 to 4 times walking five minutes between runs.
4. Walking and easy running to complete the workout.

Tuesday:

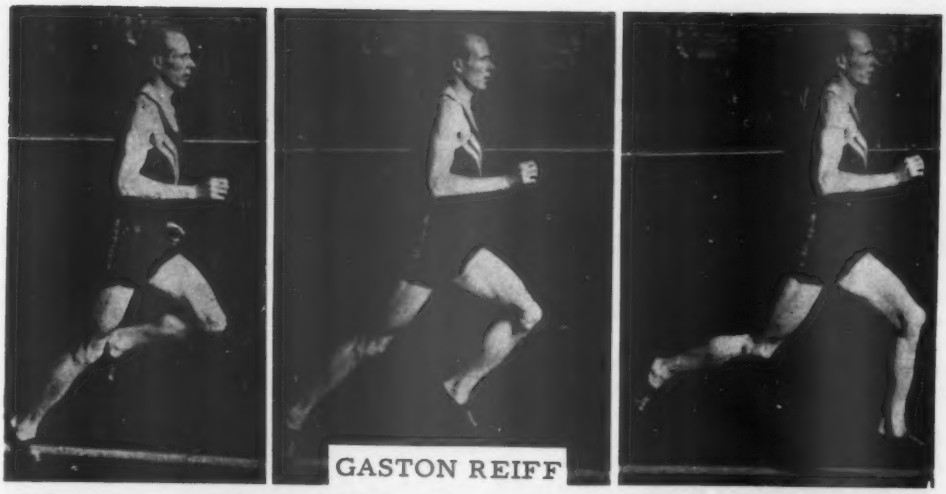
1. Fartlek 20 minutes.
2. Milers run 880 two sec. per lap slower than pace.
3. 1320 men 880 "
4. 880 men 660 "
   660 men 440 "
   440 men 330 "
3. Repeat within one hour.
4. Finish practice with easy running.

Wednesday:

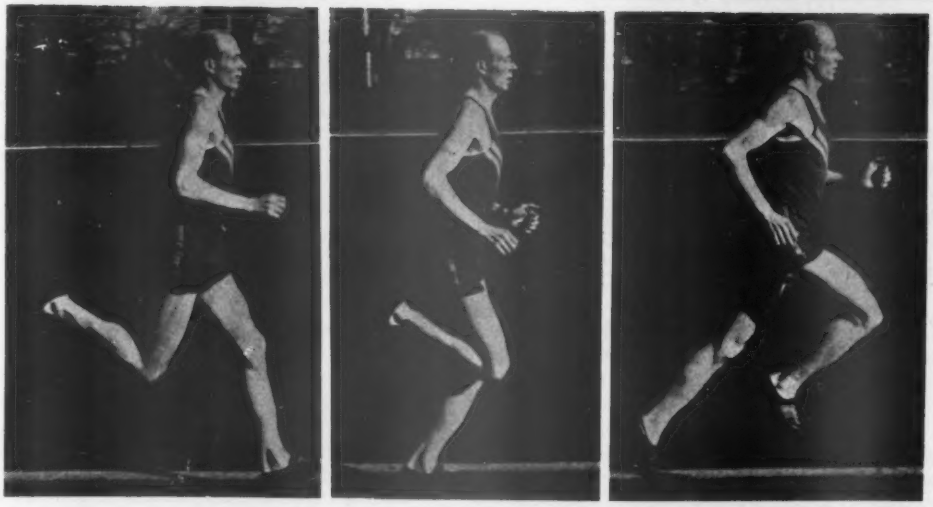
1. Jog four laps.
2. Do a lot of walking.

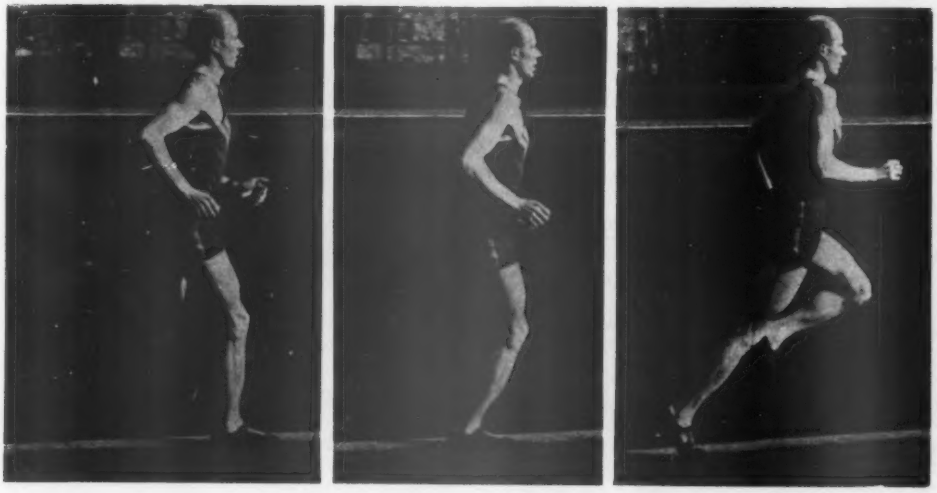
Thursday:

1. Rest



GASTON REIFF





Friday:

Competition

Saturday:

Same as Monday

Sunday:

Rest

If competition is on Saturday, the Wednesday workout will be the same as on Tuesday with Thursday as on Wednesday etc.

During the mid-season 660 men up to milers can substitute one of the following three schedules for their Monday and Tuesday (Friday competition) or Tuesday and Wednesday (Saturday competition) routines:

I.

1. Warm up 15 minutes.
2. Four laps at easy speed.
3. Mile at half speed with the last 440 at 3/4 speed.
4. Walk 5 minutes.
5. 880 at 1/2 speed the last 220 at 3/4 speed.
6. Walk 5 minutes.
7. 440 at 1/2 speed the last 100 at 3/4 speed.
8. Walk 5 minutes.
9. 220 at 3/4 speed.
10. Walk 5 minutes.
11. 110 at full speed.

II.

1. Warm up 15 minutes.
2. Four laps at easy speed.
3. 880 in 2:20. (This will have to be adjusted for each individual).
4. Walk until you can run another 880 in 2:20.
5. Three of these half miles are a good workout.

III.

1. Warm up 15 minutes.
2. Run 100 yards at full speed and jog 220, run another 100 and jog 220. So this for one mile.
3. Every week try to cut down the distance jogged until theoritically you run a mile at 100 yard speed.

Each man must adapt these practice routines to his own ability.

The following is a summary of the competitive season of Tom Brown. Tom is 6'1" tall and 135 lbs. His best timed 440 was 52.1. His best timed 1320 was 3:14.0. His best half mile time last year was 2:01.3. His training schedule followed generally the schedule above with repeated speed work at the 440 distance beginning at mid-season. Partial times for his races during the past season follow.

	Mar. 2	Mar. 6	Mar. 12	Mar. 16	Mar. 31	Apr. 6	Apr. 21	Apr. 27	May 5
220	———	———	35.1	28.3	27.0	29.2	28.3	27.1	26.5
440	61.3	61.3	66.9	56.3	58.7	59.3	56.2	54.6	56.0
660	———	———	———	———	1:26.9	1:28.0	1:24.6	1:24.5	1:23.5
880	2:02.1	2:07.5	2:06.3	1:59.0	1:59.6	2:00.3	1:55.9	1:55.6	1:55.4

	May 19	May 26	June 2	June 9
220	26.0	27.1	26.8	27.0
440	53.5	56.2	54.1	55.2
660	1:22.7	1:24.3	1:23.7	1:26.1
880	1:55.1	1:55.8	1:54.3	1:55.2

THE STEEPLECHASE

By: "Chic" Werner
Pennsylvania State University

It is indeed an honor and a privilege to speak to the first International Track Clinic, and I trust that we will have many more such affairs each year. Our sport, track and field, is making unbelievable progress, forging ahead by unprecedented performances each year, and it is largely because of such meetings as this clinic, at which we can point for the motivating foundations of this progress. Unselfish exchanges of method, plan, principle, technic, etc., between competitors, coaches, and nations are symbolic of this sport. We are unique in this respect, and should all resolve to make every effort possible for the continuance of these unselfish and healthy exchanges. We American track coaches here are all grateful to the foreign members of our panel for their part in this venture.

I have been asked to speak on the steeplechase. My knowledge of this event, as of all other events in this sport, comes largely from what I have learned from the athletes with whom I've worked. These boys teach us, and make no mistake about that. We are the coaches, but they teach us the things to impart to their successors.

In the late twenties, in the University of Illinois, we had a graduate student named Spencer, who worked out to get in shape for the steeplechase and did make the Olympic team in either 1928, or 1932, I've forgotten which. At this time, we built a steeplechase course right in the Stadium at the University of Illinois, and I recall during the months of April, May and June going out and working with Spencer, in an endeavor to help him get in shape to make the Olympic team. Later on, while I've been at Penn State, some of our distance runners, the two Ashenfelter boys, Horace and Bill, and Curtis Stone, among others, have made barnstorm trips to Europe, and I have told them to keep their eyes open for certain things, and to ask a lot of questions, and exchange ideas with the foreign athletes, and then to report back to me on what they've learned when they come home. I think that whatever I have to say here today on the steeplechase will be largely a repetition of what I have learned from these boys, along with what we have put together at the University in trying to get the boys in shape. At the same time, I have made a few foreign trips, and discussed with foreign coaches the methods used in the steeplechase, and I've done a good bit of observing myself. I think that one of the nicest things I can say is that our boy, Horace Ashenfelter, who won the steeplechase in 1952, and broke the world's record in so doing, has shared the credit for his victory with so many people, that it would be impossible to acknowledge it all right here. But he especially feels grateful to the athletes from the foreign countries who worked with him, and unselfishly tried to teach him some things, as well as the coaches at the New York Athletic Club with whom he worked, Joe McCluskey and Tommy Quinn, Fred Wilt and Paul Pilgrim. I can't think how many questions I have asked Curtis Stone, Bill and Horace Ashenfelter regarding the various things they have learned from others, so that they could impart this to me, in the hope that I might pass it on to another lad later on.

I suppose that before we go any further with this, we had better talk a little bit about the event itself; what it's like, what composes the event, and the rules.

RULES:

Here are the rules for the steeplechase as printed in the International Amateur Federation Handbook. Rule 29 The Steeplechase: The standard distances shall be 3000 meters, which is one mile, 1520 yards, 2 feet, 8 inches. There shall be 28 hurdle jumps, and 7 water jumps included in this event. The water jump shall be the fourth jump in each lap, and the distance from the starting point to the commencement of the first lap shall not include any jumps, the hurdles being removed until the competitors have entered what we shall call the first lap. So the distance from the starting point to the commencement of the first lap without hurdles, is approximately 270 meters. The distance from the first hurdle to the second hurdle is 78 meters, from the second to the third hurdle, 78 meters, from the third hurdle to the water jump, 78 meters, and from the water jump to the fourth hurdle, 78 meters, and from the fourth hurdle to the finish line, 68 meters. This makes seven laps of 390 meters plus the starting distance to make up the 3000 meters. In brief, it means that there shall be a start of a steeplechase run of about 270 meters, and then a hurdle is cleared, a second hurdle, a third hurdle, and a water jump, and then a fourth hurdle, and this will continue for seven laps plus.

Now, a brief description of the hurdles. Of course, when you go to construct one of these steeplechases, I would suggest that you buy the rule book, and do this more accurately. But in brief, the hurdles are to be not less than 91.1 cm. or more than 91.7 cm. in height, and shall be at least 3.66 meters in width. This means about three feet in height and about 12 feet in width. In addition, it is recommended that the top bar of the hurdle be 127 mm. square, so that it will not be easily overturned, made of heavy timber. This is about 5 inches square. You will need four of these hurdles, which are 3 feet high, 5 inches square on top, and about 12 feet in width. The water jumps shall be 3.66 meters in length and width, which is about 12 feet square. The water shall be 76 cm. or about $2\frac{1}{2}$ feet in depth immediately in front of the hurdle, and flooded to the level of the field at the further end. The hurdle at the water jump shall be firmly fixed in front of the water, and shall be of the same height as the others in the competition. Each competitor must go over or through the water. Anyone who steps to one side or the other of the jump, or trails his foot or leg along side any jump or hurdle shall be disqualified. He may jump or vault over each hurdle, or place a foot on each hurdle, and on the hurdle at the water jump, but he cannot go around them. Other than that, the rules of the race are quite similar to those of any other distance race, that is, you must be clearly two strides in advance of a competitor before you pass him, and there shall be no elbowing or jostling, or things of that nature. In brief, those are the rules of the steeplechase.

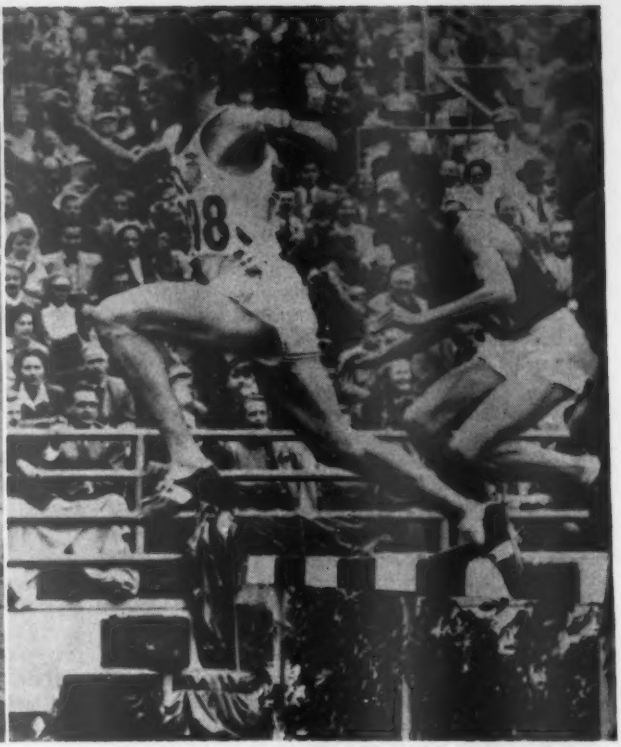
NOW STANDARDIZED:

An effort has been made to standardize this event so that now we can have a world's record. Prior to the past year, it has been a 3000 meter race, but it was so unstandardized in the placement of the obstacles that world's records could not be accepted. Just last summer, while I was in Finland, I witnessed the world's record performance in the 3000 meter steeplechase in the Olympic Stadium by a very fine Finnish athlete, and when it was announced that he had broken the world's record, and his time was not quite as good as that with which Horace Ashenfelter had won the Olympic race, I questioned this, and it was cleared up by the Finnish coach who told me that when Ashenfelter made his Olympic championship and established what was considered a world's record then, it was not standardized, and the record did not hold. However, his time of 8 minutes, 45-4/10 seconds is still a good performance and while it may or may not be a world's record time, it will be a good one for the boys to shoot at. In other years, the steeplechase has not been always 3000 meters. For example, in 1900 an American named George Orton, from the University of Pennsylvania, won the 2500 meter steeplechase in 7 minutes, 34-4/10 seconds. In 1904, Jimmy Lightbody of the Chicago Athletic Association won the 2500 meter steeplechase in 7 minutes 39-6/10 seconds. From here on in, I believe that we can feel that the steeplechase will be a standardized 3000 meter event, and we will have world's records as we do in every other event.

TYPE OF MAN:

Qualities and Prerequisites: The first item I would like to talk about in the steeplechase is the type of man who would be considered to be the ideal candidate for this event. I just do not believe that we can set up certain criteria as to the man's size, weight, age, and things of that nature. I think that the good steeplechase men have been of so many varied descriptions and types that that part of it is beyond my description. I do feel, however, that there are certain requisites. The first might be that the steeplechase runner be a very fine distance runner. As a matter of fact, I talked to Curtis Stone and Horace Ashenfelter about this very thing, the type of man, and they both agreed that the ideal would be one who could run close to 4 minutes in the mile, or in the 8:40's for the two mile. You can see from that that they are putting a standard upon this individual, which makes him be a very outstanding distance runner. In addition to being a good distance runner, the ideal candidate should be a man of unusual suppleness and pliability, so that he can get over these obstacles, and get over them in an efficient manner. I'll talk a little bit more about the technic of doing this efficiently later on. Right now, I'd like to give you the names of some of the outstanding steeplechase runners of past years. I'd like to start with a couple of great Finnish athletes: Iso-Hollo and Rinteepaa and a great Swedish runner, Kurt Soderberg, Kazantzev the Russian who ran such a splendid race at Helsinki, and John Disley of England, Gude of Germany, Segedin of Yugoslavia, Rodney of Chechoslavakia, and T. Sjostrand of Sweden. Those were some of the outstanding men of past years. We must not forget our Americans, George Orton, Joe McCluskey, Forrest Efaw and others. Some of the present leading candidates are the great Polish athlete, Chromik who has already run 8 minutes 40-2/10 seconds. Karvonen of Finland has run 8 minutes 45.4 as has Vlasenko of the Soviet Union. Rozsnyoi of Hungary has had a mark of 8 minutes 48, and so has Laine of Finland. Larson of Norway has an 8 minute 48.4 seconds. These, I believe are the outstanding men right at this point. In all of this, I don't think we should forget our own boys. I think that Horace Ashenfelter would have to be included. In talking over this type of man, I would like to quote from a letter which I received from Horace just what he said about it: "Age; Not too important. Would guess approximately 28 to 29 years, depending upon his maturity. A few extra years' worth of experience , in maturity,

Ashenfelter goes into lead on 2nd lap, closely followed by Kasantsev and Saltykov of Russia and Rinteenpaa of Finland.



Ashenfelter and Kasantsev show perfect form over water jump on 5th lap—two laps to go in Steeplechase finals—Helsinki, 1952.

About 75 yards to go on final lap of 3000 meter Steeplechase. Kasantsev with both feet in water faltered. Ashenfelter took this jump perfectly and won race by 25 or 30 yards.

Ashenfelter wins 3000 meter Steeplechase Finals at Helsinki, 1952, in new world's record time of 8:45.5.

self-confidence and endurance will supplant raw speed and strength. He should be taller than the average distance runner, perhaps not less than 5'8". Should preferably have long legs, and be of the wiry springy type, sort of lean. Should be able to run at least 4 minutes 4 seconds for the mile or under, and would be ideal if he isn't too short or stocky." Experience is one of the qualities of maturity. We know that as you get the experience of running steeplechase races you become a very much smarter individual. This is one of the qualities that the ideal man should have.

THE EVENT:

How it Should be Run: Inasmuch as the steeplechase is somewhat of a distance event, I believe that we should now have a discussion as to the way that it relates to other middle distance running events. Going back to the very fundamental elements of distance running, I think that we will all agree to two basic principles. First, that the most efficient and least fatiguing way to run and to get the best results is when the pace is an even pace, that is, where the pace is just about the same for each quarter of a mile, or each 400 meters of the entire distance. We also know that the most fatiguing way to run and the least efficient way to run is when the pace is uneven, that is, when it is fast and slow, or slow and fast alternately. We know these two basic rules of distance running; let's see where the steeplechase event fits into this picture. To begin with, because of the obstacles in the way and the water jump it is impossible to run at an even pace in the steeplechase. These obstacles simply make the race one of ins and outs or fast and slow. Now then, the efficient way to run a steeplechase is to run with the necessary fasts and slows or ins and outs caused by the hurdles and water jumps and still make it as even as possible. When we discuss the conditioning program for this event, we will refer back again to these ins and outs. Right now, when we are discussing the steeplechase event in relation to other distance events, the most important thing for us to recognize is that although the best performances in distance and middle distance runs come when the pace is even, and although this must apply in the steeplechase, at the same time we must recognize that it is impossible because of the obstacles. There are a few more items in discussing this event and how it should be run which perhaps belong in this part of this story. First of all, you must develop an eye for distance, so that you can unconsciously shorten or lengthen your stride maybe 15 or 20 yards before taking one of the obstacles, so that you will arrive at the take-off distance without any slowing down on your part. As a matter of fact, I have witnessed in some foreign countries where the steeplechasers practice from a take-off, hitting this take-off mark with one foot or the other, so as to arrive at the proper take-off mark before the obstacle in order not to have to lengthen or shorten their stride or slow down. In talking to Ashenfelter and some of the better foreign steeplechase runners, I found they have a feeling that there is an unconscious speeding-up in the last 10 or 15 yards prior to taking an obstacle. This little speeding-up is so that you will not do the opposite, slow down. Keep in mind that the worst thing that can happen to a steeplechase runner is that of slowing down just prior to taking an obstacle. The two main things he should keep in mind are to prevent slowing down he may have to speed up slightly just before taking the obstacle and the other big thing is that when he lands on the other side of the obstacle, again he must not slow down, but must try to maintain the same momentum that he had in approaching the obstacle. The development of the eye, so as to arrive at the take-off mark at the right time, comes with practice, practice, practice and competition, competition, competition. I think that at this time we should also mention that it is important that the other competitors do not slow you down in taking an obstacle. And it is for this reason, that many of the better steeplechasers make some sacrifices in their conservation of energy to be in a position to be unobstructed by the other competitors, that is, being out in front, or at least in a place where it is not crowded. I have heard steeplechase competitors say that they almost thought that there were illegal things happening in the steeplechase which affected their running, simply because the other contestants slowed down to take the obstacles, flailed their arms to one side, or ran to one side or another to avoid each other, thereby getting in the path of the individual of whom I'm speaking. After the race, the individual realized that this was not illegal or intentional, but one of those things which could not be helped. A knowledge of this before the race will make a smart runner aware of this, and he will get himself in a position to avoid the jostling or slowing down which might be caused by the other competitors. It seems that the natural thing to do for a distance runner in a long distance run is to get behind someone and follow him, usually on the pole. This is the very thing that I am suggesting we do not do in the steeplechase, since it is this act which can get you in trouble because of the man preceding you slowing down or someone else coming up along side of you, so that you are in a pocket, and you must necessarily act according to the way the competitors act, and cannot run your own race. In the steeplechase, it is much better to run your own race, and disregard the other competitors and safeguard yourself from these unnecessary obstructions.

It is quite important in the steeplechase that the runner realize that as the parade progresses, as he gets closer to the finish of the race, the hurdles and water jumps become higher and more difficult to take. This is a psychological factor. It is caused by fatigue. If the runner is aware of this

situation, he can do this to prevent it. He can keep from running the race slowly. The better steeplechase runners tell me that the easiest races they have ever run is when the pace is fast. When the pace is fast, there is no noticeable increase in the height of the hurdles or steeplechase as they go along. When the race is slow, the hurdles do seem to get higher and water jumps seem to get longer. It is much more efficient, much less fatiguing, to run at a fast pace. If there is an exception to this, it would be in the first lap and a half of the race where if the field is crowded, it may be well to avoid being slowed down at the obstacles by the obstruction of the other runners, and in this respect, it might be very smart for an exceptional runner not to wear himself out at the early part of the race getting into the lead. The best thing that he can do in the first lap or lap and a half is to keep from being slowed down by the others, even if he has to run in last place or run wide for the entire lap or lap and a half. After this, the field starts thinning out, and he should go after it in the manner in which I have said. Avoid being slowed down by the opponent, and make sure that the pace is fast enough so that it will not fatigue you.

FORM TECHNIQUE:

Hurdles: The next stage in discussing the steeplechase, I believe, would be that of form and technic in taking the hurdles and water jumps. First let us take the proper form for taking the hurdles. Since this is not a sprint hurdle race, like the 400 meter hurdle or the 110 meter high-hurdle or the 200 meter low-hurdles, but a 3000 meter race, it is important that the hurdlers make no effort to stretch out and have what we call good hurdle form. It is much better for him to jump up, rather than over the hurdle, and to land in somewhat of an upright position, well in balance to continue his motion. The average steeplechase runner, I think, would be wise to learn to take the hurdles from either foot -- to take off from the left foot one time, and the right another - so that he will not have to chop his stride and slow down to go over the hurdles. Whether the trailing leg goes out to the side as in good form for the regular hurdles or whether the trailing leg tucks under or just drags or hangs, it is immaterial. The best way to make the hurdles is in a relaxed, easy jumping form, which is taking nothing out of you and you land on the other side relaxed and without any loss of motion. I do believe that as time goes on, and the event improves, we will find that the steeplechase hurdlers will come closer to good hurdle form, but at this point, the emphasis should be on being relaxed, which is very much more important than good hurdle form. I do think it is important that the hurdler land on his feet facing straight down the track, rather than at an angle. If the hurdler lands with one foot pointing sideways, then he has a wobble for the next two or three strides, which will ultimately wear him down. It is fatiguing. He can learn to take off and land with his feet pointing straight ahead. As to having the arms in close to the side as we do in the hurdles, and having body lean, and being all strung out like a good hurdler, I do not think this is important. In fact, it might be better if it were avoided. I have seen some steeplechase runners wear themselves out, because of having good hurdle form. I have seen several great champions in world record performances in the steeplechase but I have yet to see one of these great athletes have what I would call good hurdle form. On the other hand, I have seen many fellows who have had to drop out without finishing the race because they did have good hurdle form. One way to look at this hurdling might be this: try to go over the hurdle in such a manner that when you land, you can continue on running without any deviation in the course or deviation in your momentum. Do this the easiest way possible. My own opinion is that the easiest way is to simply jump over the hurdle, try to keep your shoulders square, looking straight ahead down the track. Don't have your feet sideways, or anything but straight forward, I think this will come to you. It will take practice, however.

Water Jump: Now we come to the technic or form of the water jump. Here again, I believe the development of the eye, so as to be able to come to the take-off for the water jump without an alteration in your stride, without lengthening or shortening your stride, or without slowing down, is the important thing. As I said, some runners put a check mark prior to that, and I don't think this is the best thing to do. I think the best way to do it is develop an eye, what I have called, "The judgment which comes from experience." Now then, again, taking off for the water jump should be done in a relaxed manner, one in which you spring upward with some forward momentum, trying to continue your forward motion, rather than having what I would call good form. Let me describe the technic of what I call good form and see whether it is the picture you have of it. The runner approaches the water jump with a certain amount of momentum. He springs up onto the 5 inch cross bar, lands on there with his lead foot, with his lead leg bent, lets his body ride over that leg while it is still bent, and he then is falling forward with a great forward lean, with his foot still on the 5 inch cross bar. Now, he extends his lead leg, and at the same time takes a long step out into the very end of the water, in the shallowest portion of it, landing there on the take-off leg, with the leg from which he sprang off the cross bar going right out for another step in front of the water jump, so that he will continue running with no apparent loss of momentum. Very briefly, that is a description of how it happens. Now let me give you some of the very important elements of that. First of all, the take-off before the water jump must not be a long jump--it must be a

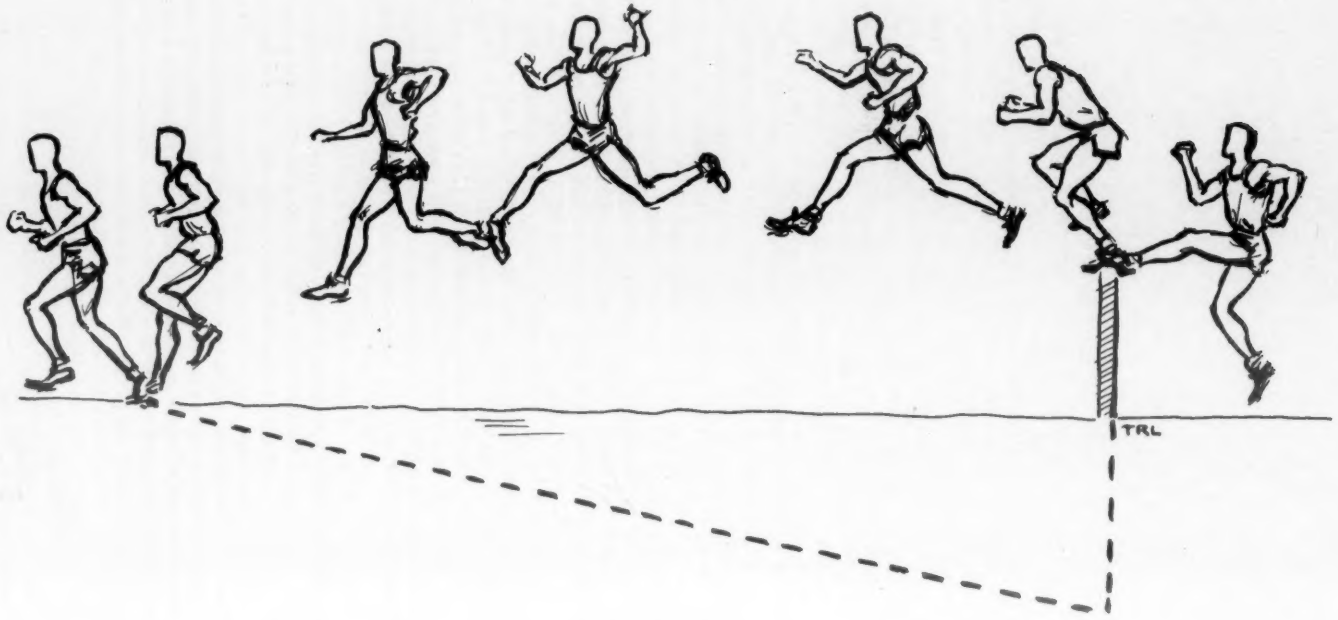
relaxed take-off, and you must land on that jump in such a manner that the leg which lands there is bent until the body is falling forward beyond it. Perhaps the most important feature of good technic in the water jump is that when the spring is made from the cross bar, it is not made upward, but forward. This is caused by the delay in straightening that leg until the forward momentum of the body is in what we would call an exaggerated lean. Then you can land and continue running without alteration of your forward momentum. The other alternative is to straighten the leg when the body gets right over the center of gravity, or over that foot. That will cause the body to go upward and land going downward. The result will be a slowing down of the forward momentum, and this is what we do not want to have happen. I might tell you of a little secret which Ashenfelter told me that I might give to you. It is one that he treasures very highly. He tries to land on the top cross bar of the water jump in such a manner that most of his foot is on the forward side of the cross bar, so that he will be in a position where it will be impossible to spring upward. The only way that he can spring is forward. So that you will understand this a little bit further, let us take the opposite of this, where you would land with your foot on the back side of the cross bar, and if you extended it at the wrong time, it would push you backwards, rather than upward or forward. The thing that Ashenfelter is trying to suggest in this technic is that of putting your foot on the crossbar so that you must push forward, not upward. Some runners, when fatigue hits them in the latter parts of the race, have a tendency to jump upwards in taking off to the water jump so that they land on the cross bar in a static position. These fellows should make more of an effort to jump forward, instead of upwards, regardless of fatigue, onto the crossbar, and then fall forward before they extend this leg. Another important item in this landing after the spring from the cross bar is that the landing should be made on one foot and then, later on, the other step continues the forward running momentum. There is a great tendency on the part of steeplechase runners to land with the one foot in the water, or with one foot in the water and a very short stride outside of the water. This is very bad. It must not be a quick one-two landing, but it must be a "one-pause-two" landing, with a normal running stride after landing in the water. I believe that this just about takes care of what we would call the skilled technic or form for the hurdles and the water jumps.

Conditioning: Now we go into that very important matter, conditioning for this race. Conditioning for the steeplechase, then, would be very similar to conditioning for any middle distance running or long distance race, with the exception of the obstacles on which the runner must practice in order to develop resistance to fatigue and to build up stamina to cover them at a good pace. Present day conditioning methods for middle distances consist of mostly running of the interval style, that is, repeats of different lengths of running with very little rest in between. Theoretically, the idea back of interval running is that one builds up resistance to fatigue by working hard under fatigue conditions. In other words, it is the work you do when you are tired that develops strength and resistance to fatigue. That is where you get your stamina. That is where the value of interval running comes. The Fartlek type of running, and incidentally, I think that this word, F-a-r-t-l-e-k- comes from the Swedes and translated, the word means "speed-play", is different from interval running in that it is a long distance run wherein the pace is varied according to the individual's desires. There will be a period wherein he runs at a fast pace, and period where he runs at a restful, slow pace. That is what we call Fartlek running. A certain amount of this is very beneficial to the steeplechase runner. It would be more or less in the nature of building up endurance, as we do in cross-country running. Now then, the real type of work-out is the interval type running, and before I make a suggestion as to what type of interval running should be recommended, please understand one thing. The good steeplechase runners are mature men. This takes the average college boy out of this program. The event is a little bit too tough, I think, for the boy to get into while he is still a college student. This stage, while he is a college student, is the time for him to be developing speed. Later on, when he has graduated from college, or when he is older and more mature, then is the time for him to develop endurance and stamina. It will come to him, but the speed is for the young fellow and the endurance for the older one.

Assuming now that we're working with mature men, here is a good program to follow for early season running. On Monday, endurance work of the over-distance type, say about five to eight miles at a good pace. Do a little Fartlek running with this, that is, have some fast sprints, say up to 200 yards. Try to do this on grass, so that you will not get sore feet. On Tuesday, I would do some speed work of the interval type of running, and here I would suggest to the boy that he have a little bit of choice in the matter as to what type of speed running or interval running he should do. For example, he could take two 3/4 mile runs, or 4 half-mile runs, or 6 quarter-mile runs, or 10 or 12 220 yard wind sprints. I would use the watch on this, and make an effort to do it according to a pre-determined time. I would have about a 2 to 5 minute jog in between each one of these, regardless of which it is, even if it's the 3/4 mile run. There is some value in letting the boy do his own choosing, instead of following the dictates of a pre-determined program. But by and large, for the steeplechase man, the great benefit will come from doing a greater number of the runs. This is hard to understand, but where he has an alternative of say two 3/4 mile runs, or 6 quarter-mile runs, the real benefit I would think comes from

the 6 quarter-mile runs. It is the greater number of repeats that are beneficial to the steeplechase runner rather than the fewer longer ones. We will assume that he has some inherent speed and is trying to build up stamina. That is the basis for this conditioning program. On Wednesday, approximately four miles at a good pace, but always relaxed. Thursday, let's get out some hurdles and practice for form. Now, remember, when I say form over these obstacles, it is far different from what we call good hurdle form. We are relaxed, we are going over the hurdles with a leap and not striding over them. Try to work for relaxation. Get a good workout, but don't overdo it early in the season. Work on two or three hurdles and then return and do it again. I might tell you that when the two Ashenfelter boys and Curt Stone were seniors in college and getting ready for the steeplechase in the AAU meets or some Olympic trial, I don't recall which, we put about six hurdles out on the center of our football field in haphazard fashion. There was no semblance of putting them in a circle or anything, and they would run over these hurdles. One might be 18 yards from the next one, which would be 31 yards from the next, at random distances. But they just ran over these hurdles, running around and zig-zagging a course on this football field and the workout was usually at least one hour of this. We would talk to them while they were running; they were relaxed and I know that they got a good deal out of this workout. It would be also well to practice on the water jump. I would suggest that you don't have to have water in it, because you're practicing for technic or form, rather than to develop stamina. On Friday, we have a very light workout, Saturday we work with the watch, or in competition. Ordinarily, it would be a flat race, rather than a steeplechase. I rather have the feeling (which is shared by the better steeplechaserunners) that in the course of one year, four or five competitive steeplechase runs are about enough for anybody. One thing that I do not like about the program as set up in the Olympic games right now is that it's only one, two or three days between the trials of the steeplechase and the finals. It would be much better to have the trials real early, and the finals real late. Now along with this conditioning program, we have failed to mention certain items such as warming up, doing stretching exercises, calisthenics, and we have also failed to mention the cooling down period after the race. I believe that a good steeplechase runner, just like any good middle distance or long distance runner, should take 15 to 20 minutes in having a slow cool-out after the work-out. This might be just a jog of one or two miles, but it's very important. The entire work-out should take about 80 minutes, or say $1\frac{1}{2}$ hours. It would be well for a fellow to plan on that much of a workout each day and to follow the program somewhat as we have set it up. Recently another type of conditioning exercise has gained popularity; what we might call the off-season weight-lifting. I believe that a certain amount of lifting is in order for the steeplechase runner. But here again, as we said in the interval running, I think the great benefits come from the lower weights, from about 40, 50 or 60 pounds, wherein the activity can be speeded up rather than in the heavier weights where the activity is slower. I think that this will develop the legs, the back, arms, and other muscles which will be beneficial in steeplechase competition. If nothing else, this weight-lifting of the lighter and speedier type of workout will give the man balance and poise, which is very essential in the steeplechase. It might be well for the steeplechase runner to keep in mind that this is a seven day program, and that Sundays should be included in the workout as well as every other day. I've stated earlier that this program is sort of an early season program. I would follow the same type of program in mid-season and peak season by just simply adding more to the interval running. For example, if you have been doing 6 quarter miles as you progress, let's not speed up the quarter-miles, but start doing 8 or 10 or them, and 15 up to 20. You might reach the point where you'll be like Zatopek, and do an iron man's workout, but you must be careful when you reach that point that you don't start losing your speed. At the peak of condition, I believe that a man doesn't need much workout. What he needs then is rest, and the program should be so arranged that he will have some rest. He must be mentally poised for this thing as well as physically.

I believe that that concludes my talk on the steeplechase, and we'd like to throw the discussion open for questioning at this time. In conclusion, I'd like to say that I think that the steeplechase is one of the most spectacular, most interesting races of the track and field program. It's a race of speed, a race of endurance, a race of skill, technic, strategy and everything that you could think of that should be in a very good contest. Now, in America, we have not concentrated on the steeplechase as much as we should, or as much as the foreign countries have, and I think that's partially because our athletic program is 99% college. The steeplechase is an event for the more mature men. I do like what I have heard is going on in England and some of the other countries where they have in their program a 3/4 mile steeplechase event. It might be well for us to give some thought to that here in America. Thank you very much.



ARNE NYTRØ
"EUROPEAN STEEPLECHASE RUNNING"

THE STEEPLECHASE

By Arne Nytro
Norway

The steeplechase demands a long distance runner's condition and a 400 meter hurdler's technic. Added to this comes the passing of the water pit, which is a broad jump from an elevated take-off plank.

RULES

1. The distance is 3000 meters.

2. The runners have to pass 28 obstacles and 7 waterpits.

3. The water pit is supposed to be the fourth jump in each lap. The finish line can be any place on the track.

4. The distance from the start to the start of the first lap is run without obstacles. Usually each lap will be 390 meters because of the water pit's placement on the inner track. Seven rounds of 390 meters each is 2730 meters. The start must, therefore, be at such a place that it is 270 meters from the finish line. On this distance there are no obstacles. Then three obstacles, the water pit and another obstacle appear, which all have to be passed in each of the seven rounds. The total is 35.

5. All the obstacles have to be between 91.1 cm and 91.7 cm (2'11-1/8" - 3'1/8") in height, 12.7 cm (5") in width at the top, and at least 3.66 m (12') in length. The water pit's length is 3.66 meters (12').

6. One can pass the obstacles by swinging oneself over, setting one's foot on top or jumping over.

RUN TRAINING

Each result in longer races is dependent on the individual's combustion effect (the body's ability to utilize its nourishment and acid), how long and how well one has trained, will power, patience, time and ambitions. Where one's capacity lies, one will not be able to answer until after 4-8 years of diligent training and competition.

The run training itself for a steeplechase runner must be the same as for an ordinary runner. During the training, one places much emphasis on the intervals, where one runs with the same average speed as one does on the special distance or faster (this will be about 18 seconds for 100 meters for one who runs 9 minutes, and 17 seconds for one who runs 8.30 minutes). The length of the intervals can be 100-200-300-400-600-1000 - but the best are 200, 300, and 400 meters. Between the intervals, one runs easy or walks. In a week you work 2-3 days on the track and 4-5 days in the woods (summer), but in winter all days outdoors. A few athletes train for short intervals one day and longer intervals the next day, but then the short ones should come first, when one is fresh. The number of intervals per training workout depends on the runner's stage of development, the length of the intervals and the intents and season. Remember that during training one never runs faster than to keep a good style.

OBSTACLE TRAINING

A steeplechase runner should also add the obstacle training during the workouts so that one gets used to the break in the rhythm of one's running and also be as free and as relaxed as possible when passing. During competition this happens every 80 meters.

The fastest way to pass the hurdles is to use the same technic as in the 400 meter hurdles. To be able to do this, one has to be flexible in the hips and one must be strong in the muscles which lift the thighs up in front, and in those which lift the rear foot out, up and forward.

For flexibility one can train by body and leg circlings, and by body bendings forward and sideways. One will be strong only by weight training of those groups of muscles. I use mostly sandbags made of canvas, 10-20 lbs. for developing of strength.

One trains in the technics of walking, later running, close to the obstacle. One sets the first leg about a foot in front of the obstacle and lifts the other leg over the obstacle and forward to a new step. Be sure that the knee is higher than the foot when the leg is drawn forward, that there is less than 90 degrees angle between thigh and leg, and that the toes point out to the side.

The first hand (the opposite of the first foot) has to hang loose and low forward. Train and control these movements hundreds of times. When they are practiced one can start to run over the obstacle. Then one must fling the first foot right toward the obstacle, and draw the other leg fast after and forward to new running steps. The upper part of the body shall slope a little forward with the shoulders parallel with the uppermost edge of the obstacle. It would probably be an advantage, if one could train oneself to pass the obstacles both with left and right leg first, so that one would not trip in front of the obstacles if the length of one's steps in between the obstacles do not fit. They who have a right take-off foot have an advantage over those who take-off on the left foot. Use obstacles, high jump stands, boxes, chairs, etc. for the training of the technic. Obstacle training should be done on each training day because it is on the obstacles that a good runner will gain seconds.

WATERPIT TRAINING

At the waterpit one has to run up on the 91.5 cm high obstacle to take-off for the jump, which will bring the runner over the water, or as close to "land" as possible.

Here one first must have a good technic on the obstacle, so the speed will remain. One must have great take-off power in the foot one puts on the obstacle, and one must be so strong in the landing-foot that one does not double up.

I mean that one should put the take-off foot on the obstacle. Place the foot on the front edge in such a way that when it rolls over the front spikes catch in the other edge. The body shall go low over the obstacle. Therefore, bend well in knee and hip so that the buttocks come pretty close to the heel. When the buttocks have passed the top of the obstacle, one straightens one's body and the take-off leg as fast and as powerfully as possible at the same time as the swing-foot and its opposite arm are flung forward. In the hang one must concentrate on the landing, which gives a possibility to start running as fast as possible. Therefore, the body must lay over or in front of the landing foot.

The landing happens on the ball of the foot and one gives a little after in the knee and hip. The upper part of the body should fall forward easily. The first step after the landing must be short and fast. The passing of the water pit should be so good that the runner will just be wet on the landing foot. (Preferably he should be dry on both feet).

To get a long and good jump the speed must be as great as possible. Therefore, one must increase speed about 15 meters from the waterpit, and one must, by a bounding jump up, try to keep it and perhaps improve it by a powerful off-kick from the obstacle.

One should train a great deal on the passing of the water pit, as it is here that most time is usually lost. If one does not have the waterpit at hand, then one can make a good substitute by fixing a plank or box between two trees and dig up a pit for landing.

To strengthen the legs, one must jog, broad jump and high jump--angular to the bar. Also important is the weight training to strengthen the stretch muscles. Train both legs.

(Editor's Notes) Mr. Nytro spoke of the two kinds of development which are the objectives of training: (1) Developing inside strength, by which he means the body organs, lungs, blood etc. and (2) outside strength, the limbs, muscles, etc.

He sketched the training of the potential steeplechase runner. The boy of 16 or 17 trains three times a week and usually skis on Sundays. Their training consists of repeat work and Fartlek. Their repeat work is over short distances, 200 or 400 meters, and occasionally a mile with bursts of sprinting at intervals. In the spring they run cross-country and compete on junior teams (under 20 years) in road relay races. They compete in ten to twenty races a year at distances of from 400 to 1500 meters. In winter they run outside in parks or on the roads with spikes. Winter running develops speed and style and helps avoid foot injuries later.

At 17 or 18 they take part in the 1500 meter steeplechase without the water jump. At 18 or 19 practice increases, 5-7 times a week. In summer they again run in the fields and woods. At the age of 22 or

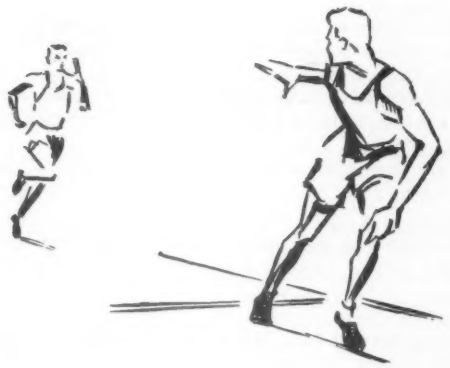
23, after five to six years of training, the amount of practice is again increased, starting the season in November. Most of the work is done from 6 to 8 or 9 in the evening, after work and studies.

At the age of 25 to 27, they practice twice a day, an easy morning session before work and the more intensive work at night. Their best men are about 29 or 30 years of age and are not necessarily born distance runners; they are the result of 10 years of training.

The steeplechase runners race from 5 to 10 times a year plus races at 5000 or 10,000 meters. They train, though easily, on the morning of the meet. They take their speed work, 100 or 150 meters, when they are fresh and also at the end of a workout. This also applies to middle distance runners.

Outside strength is gained by running and by the use of weights. He uses sand-bags weighing from 10 to 20 pounds. They do bends with a sand-bag on the back of the neck, running and jumping in position with the weights and sit-ups with the weight on the back of the neck. The exercises are not merely stretching; they are strengthening.

Mr. Nytro estimates that the obstacles add 30 to 35 seconds to time on the flat. He says that the great improvements in records can be attributed to improvements in technique due to more work being done on the obstacles. He thinks the difference can be reduced to 25 seconds.



RELAY RACES

by: Jim Elliot
Villanova University

The national relay games have done more to popularize track and field athletics in the United States than any other events or methods.

The system of conducting the relay carnivals and creating intense rivalry among competing teams, and arousing interest among spectators in seeing exciting relay teams compete has attracted the general public to attend the contests. In many instances there have been from 30,000 to 40,000 people present to see such relays at the Pennsylvania, Drake, and Coliseum at Los Angeles carnivals.

The relay games started in 1895 at Pennsylvania.

At the Pennsylvania relays there have been as high as 524 schools and colleges and 3,000 contestants on the entry lists of the 100 events.

Following the example of Pennsylvania, John L. Griffith in 1909 started the Drake relays at Des Moines, Iowa. These relays have grown to be as large as those held at Philadelphia.

The relays have been successful wherever tried and the idea of holding them has spread to all parts of the United States.

Relay games have been held at Kansas, Ohio State, South Dakota, Texas, Illinois (Indoors), Washington (Seattle), Georgia Tech, California, and Michigan State (Indoors).

Many of the relay carnivals have had among their contestants the outstanding performers in the country. Several have had novelty events, such as the football relay at Drake.

At the present time, the majority of the contestants are eligible competitors from schools and colleges.

The relay races have created interest and enthusiasm among boys and men in track and field athletics. In the writer's opinion, the relays are going to continue to be popular with the track athlete and with the general public.

The most common relays are one mile (4 x 440 yards), one-half mile (4 x 220 yards), and the quarter-mile (4 x 110 yards). These relays are used in many dual and conference meets. The mile relay, used in all sections of the country, is probably the outstanding relay event in a majority of the meets. The other relays are as follows:

- Two-mile relay (4 x 880 yards)
- Four-mile relay (4 x 1 mile)
- Sprint medley (440 yards, 220, 220, 880)
- Distance medley (440 yards, 880, 3/4 mile, 1 mile).

In the shuttle relays, each man runs 100 yards, back and forth. Two men of each team are stationed at each end of the 100 yards. Numbers 1 and 3 at one end and Numbers 2 and 4 at the other end. Number 1 runs 100 yards and takes baton to Number 2, Number 2 back to Number 3, Number 3 forward to Number 4 back to the starting point for the finish. Sometimes the runners merely touch each other rather than carry the baton.

The high hurdle shuttle relay race has become interesting at many of the games. It is run in the same manner as above described, except the high hurdles are used and the distance covered in one lap is 120 yards instead of 100 yards. Each team has two flights of hurdles. With the two flights, the setters have a chance to put up knocked down hurdles.

Men should train for the relays in the same manner as they train for individual events. If an athlete is training for the one-mile relay, he should train as if he were to enter the quarter-mile race. The difference comes in learning how to pass the baton.

It is important for the coach to have his men placed correctly and in the order in which they are going to run in the relay.

Many relay teams, especially the one-mile teams, follow the plan of starting their third-best man first, their fourth-best man second, their second-best man third, and finish with their best man.

The usual way has been to start with the second-best man first, the fourth-best man second, the third-best man third, and the best man last.

The plan for running the relays varies:

Getting the pole is an advantage in the mile relay. Therefore, it might be well to begin with a fast starter. The man who starts should be strong and not easily tripped. If a man gets too nervous waiting for the baton, it probably is better to start that man first.

Another important factor in deciding the order in which to run men is to know whether they run best from front or behind. Some men may not be able to judge their pace when running in the rear of others; or, because of being behind, not being fighters, they may lose their confidence. It is important to place these men where they will be able to do their best. Because of the excitement of the race, some men run better as it progresses.

The team should analyze the opposition. The coach or men should decide whether the best tactics are to run the opposing team "off their feet" or not. Some teams are composed of men who do not know much or anything about their pace and they often run themselves down in the first part of the race. In the longer relays, this is often true.

The form in passing the baton in the sprint relays is very important. In the mile relay, a great advantage may be gained by good passes.

The baton is 11.81 inches (295 millimeters) long and its circumference is 4.724 inches (109 millimeters). The weight must not be less than 50 grams.

Each team is required to carry a baton and each contestant must pass it to the next man up within a 20-yard zone.

The form used in the distance relays differs only slightly from that followed in the sprint relays. The principle involved is the same. The idea is to make the exchange of the baton from one member of a team to the next man when both runners are as near full speed as possible. This results in the receiver getting a "flying start". In making a good exchange, there should be daylight between the man making the delivery and the one accepting the baton. The receiver should start from the back of the distance to make sure of the pass and thus gain momentum for the start. A definite advantage is gained by passing the baton properly. Many teams lose time in making the exchange.

As the runner approaches, the receiver should start running slowly, being careful to time his speed with that of the runner. This applies to the one-mile or longer relays. If the runner has a fast finish, make the exchange in the front part of the "touch-off" zone; if he has a slow finish, make the exchange in the back part of the "touch-off" zone.

The runner is required to carry the baton in his left hand. It is held on one end, with the back of the hand up. The runner places the baton in the receiver's hand with a downward motion of the arm. The receiver holds his right arm and hand extended backward with palm up and thumb in to make the exchange with the runner who approaches him running to the right of the receiver. When he accepts the baton, he immediately makes the exchange to his left hand and starts off fast as in a regular race.

Do not loaf, if ahead. Gain distance, if behind, for the first 30 or 40 yards.

When the receiver has accepted the baton, he should race off down the track in a straight line, and the runner with whom he had made the exchange should always stay in the lane until after his opponent has passed by. When the exchange is being made, always run in a straight course.

In many of the meets, the teams are required to alternate in the use of the lanes when receiving the batons. After he rounds the last curve, it is well for the runner to pursue a straight course. This

method will lessen the chance for a break in the stride and may eliminate many serious injuries in the touch-off zones.

The sprint relay men use a somewhat different method in passing the baton. The method they generally resort to follows:

The runner carries the baton in the same manner as above explained. The delivery is made with an upward swing of the arm and hand. The receiver places himself in the back part of the touch-off zone. Prior to the exchange, the receiver marks off a line or places a white handkerchief back of and beyond the end of the back line about six or seven strides. When the runner approaches, and immediately upon the runner's arrival at this newly-made marker, the receiver starts ahead at full speed. He glances backwards for the first three strides to align himself with the runner and then looks straight ahead as he presses forward. When he has taken about four strides, after his start, the receiver extends his right arm and hand to the rear. With the palm of the hand down, the back of the hand up, the fingers extended out and the thumb in, he has taken a position as if grabbing for something with the open hand, his elbow bent a little as the arm is extended. The exchange is made in the front part of the zone, while both runners are going at full speed. Through practice with his teammate, the receiver will learn to time himself with reference to the place mark behind the touch-off zone.

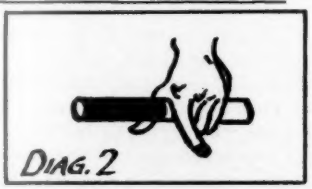
Men who run on relay teams must practice together. If the exchange of the baton is made too soon, then move the mark back. If the pass is made beyond the front end of the zone, move the mark up closer. Practice continually on handling the baton. Develop team play.

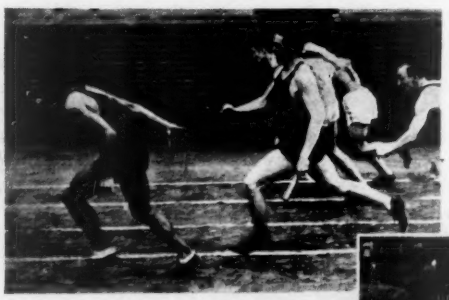
The responsibility of making a good exchange should be placed chiefly on the one making the delivery. The receiver takes the baton in his right hand.

In the early part of the season, practice with short relays. The runner should keep near the inside of the lane in rounding curves, when relays are run in lanes.

The receiver of the baton should always be in a low, running position as he starts on his run from the back of the zone.

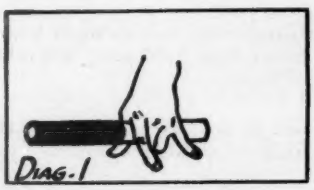
We find that there are several other methods followed in passing the baton. All are good if the right principle of the pass is mastered; that is, full speed for both men when the exchange is made.





Sprint Pass (Blind)

Mile Relay Pass (Visual)



CROSS COUNTRY RUNNING

By Karl Schlademan
Michigan State University

In speaking to any international group on cross country running, the first necessity is a definition of terms. Cross country running means different things in various parts of the world. During a comparatively recent trip through Japan with an American track team, I discovered that, because of local terrain and long established customs, Japanese cross country running is primarily road racing as we understand the term in the United States.

I suppose the original cross country races were the hare and hound races used in the English public schools, and I was quite interested at a noon clinic meeting at the time of the British Empire Games at Vancouver two years ago to discover that the English distance running athletes have decided that cross country running is not good for them in their training for the longer runs. They feel that they must run almost exclusively on a track. I commenced to understand the "why" of this when I talked to Henry Kennedy, our top cross country runner, who spent his boyhood in Scotland. He has told me that cross country running in England and Scotland really means a cross country obstacle race. They climb fences, wade ponds - in fact, hunt the toughest possible terrain to run over. This might be good for a boy's general endurance, but certainly would not add to speed on the track.

Then, there are the Nordic countries - Norway, Sweden, and Finland's idea of cross country running through deep woods where they make an all-day job of it and travel by compass to certain check points. As I understand it, whole communities indulge in this sort of outing. The type of cross country running as discussed here is that used in the American scholastic and collegiate system and is quite different from the Oriental road race or the European obstacle race.

The American secondary schools and institutions of higher learning have developed cross country as a varsity sport. They have definite courses on the campuses or the adjoining golf courses in the towns where the schools are located. These courses vary in distance from a two mile high school distance to the 10,000 meter A. A. U. Championship distance. The varsity college distance varies from three miles to five. The National Intercollegiate Championship is run at the four mile distance, the I. C. A. A. A. A. Championship at the five mile distance. The I. C. A. A. A. A. course at VanCortlandt Park in New York City is run over rugged terrain on bridle paths and across sodded playgrounds. It has one long, gradual hill and one very, very steep short hill. The course itself is a challenge. There are, however, no obstacles such as fences to climb or woods to push through and hurdles to clear.

The N. C. A. A. course at Michigan State University is quite flat and is a four mile distance and is extremely fast. It is run over sod and cinder roads. There is no way to set up national or world records on cross country courses because each course varies somewhat. Cornell University, the University of Pittsburgh, and Syracuse have extremely difficult hill courses. Pennsylvania State University, one of the leaders in cross country running through the years, has a five mile course on their golf course which features only a little flat racing, one long hill, and a lot of short, sharp pitches. It is a very difficult course. The course at Notre Dame runs around two lakes, is picturesque, flat and fast. This is enough description of American collegiate courses to illustrate the type of running done by the American high school and college cross country runner.

Before proceeding with the actual training methods used in cross country, I should like to discuss briefly but pointedly the various attitudes of certain groups of track coaches in their evaluation of cross country running and the values or lack of values derived therefrom. There is one group of coaches who insist that cross country running is detrimental to the track athlete, that it takes too much out of him in the fall, and he gets tired and run-down before the end of his spring season. There's another group who say, "We wish to run cross country, but we think that cross country competition is not good for the men." There is the final group who are completely sold on the fact that cross country running as used in the American school and college scene is indispensable to the development of real middle distance and distance runners throughout the country.

With the first group, I have no patience whatsoever; their attitude just doesn't make sense. I generally find that this group of track coaches includes the golf players and the football fans. Coaching a cross country team takes a lot of time and makes a track coach's season last the full school year. I

feel that a lot of men object to this. The second group who say, "Let's run cross country but not compete" - again, I cannot understand their reasoning. A long time ago a famous economist stated that "competition is the life of trade." Certainly, continuous running with no competition is deadly dull. I believe these coaches should take another look at their reasoning. Finally, there is the group sold on cross country. I am of that group and will discuss the various approaches to actual cross country running and competition.

The varsity track coach may approach cross country running in one of two ways - he may put pressure on his boys and try to make the sport a major effort in which the emphasis is on winning - or, he may use it as a background to develop the necessary endurance for his middle distance and distance men for the big winter and spring track meets. The approach I have always used at Michigan State University is the latter. The only pressure put on the boys of our teams at East Lansing is that which the boys themselves develop. Of course, the men wish to win and, of course, they run hard in competition; but we do not press them in training. I believe our cross country schedule is typical of the schools who use cross country as a developer for their varsity track season and of the schools that obtain what I should say are the maximum benefits from this type of running. Following is the 1956 Michigan State cross country schedule:

October 13	Michigan A. A. U. Championships (four miles)
October 20	Ohio State (four miles)
October 27	Penn State (five miles)
November 3	Wisconsin (four miles)
November 10	Notre Dame (five miles)
November 16 (Friday)	Big Ten Championships (four miles)
November 19 (Monday)	I. C. A. A. A. A. Championships (five miles)
November 26	National Collegiate Championships (four miles)

We make no effort to push the boys to fast time until the final big ten days. We generally lose one or two of our dual meets as the men come along very gradually to the type of condition needed to go through the final three big tests; namely, the Big Ten Championships, the I. C. A. A. A. A. Championships and the National Collegiate Championships. I believe the best way to illustrate the type of work that is considered necessary to bring the men up to good running condition for the final ten days or two weeks is best illustrated in telling you about how we handle our varsity at Michigan State University. Of course, the men who will probably be on the team are pretty well known to the coaching staff because freshmen are not eligible at the major schools, and we have had our men either through the varsity season or certainly the freshman year, and we know them pretty well. So, about the middle of August we get out a letter to the men telling them that the cross country season is approaching, giving them a copy of the schedule, and suggesting that it might be smart if they run easy over distance, perhaps twice a week until the opening of school. The men do this in ordinary flat shoes, and they may run down the streets of a city or over the rolling green turf of their home-town golf course or down a country road. They generally report at the opening of school, which is about the middle of September. in fair physical condition.

After they have gotten set for the year - that is, registered and settled in their rooms - we have a meeting and the men are told that the coaches can do very little for them in the next two weeks; that they should run, walk, run, walk over distance every day, and at the end of about ten days or two weeks the coaches will take charge and start giving them a program to work by. The general idea for work in cross country is about as follows:

Monday: Long easy over distance.

Tuesday: Report at the track and run a series of 70 second quarters. The number used will vary with the individual. We will start early in the season with perhaps running four 70 second quarter miles, jogging between quarters - that is, the men will cover two miles without dropping to a walk; first quarter - 70, second quarter - jog, third quarter - 70, fourth quarter - jog, etc. After the completion of this intermittent under distance pace running, the men will probably walk for a couple laps and finish with a built-up quarter mile - that is, they start out at a cross country pace, gradually increase the speed, finishing the last 200 yards wide open. As the season rolls around, this Tuesday workout will increase in length, depending entirely upon the individual involved. The men are watched very closely and when a man is tiring, he is pulled off the track. This may sound peculiar to the

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European coach, but it must be remembered that we are dealing mostly with boys from 18-22 years of age. Some of these kids toward the end of the year will run as many as 12-15 quarters and enjoy it.

Wednesday: At Michigan State we work on an open turf field on Wednesday, on which is located the start and the finish of the N. C. A. A. course. The first half mile of the N. C. A. A. course is plainly marked on this field, and the boys take special delight in running repeated half miles at about a 2:20 clip. They run all sorts of contests for malted milks, hamburgers, etc. - the winner being the boy who hits the closest to the 2:20 mark. Early in the season two or three half miles with about a ten minute jogging rest between is enough. Late in the year the men run as many as 6-10.

Thursday: We go back to easy over distance running with pickups. The course at Michigan State has a wooded section with a bridle path through it which has a loop approximately a mile in length; and the boys love to go out to the woods and try to hit miles in just under five minutes. Early in the year one is sufficient. Later in the year the men run as many as three or four of these.

Friday: We rest.

Saturday: We compete.

The above program is, of course, only a general guide to the actual handling of a squad. You have to work with the weather and with the way you sense that your boys are coming along. For instance, if we had a bad, stormy day on Tuesday, we would probably go out to the woods where there is more protection; or late in the year we might vary the Tuesday workout by running a straight competitive quarter mile or 660 yard races. The men enjoy this, and it does them good. Toward the end of the year, certainly just before the big meets, I am very much inclined to think that two days' rest stores up energy and gives you a better performance. In any case, bear in mind that cross country men and track men are individuals and must be handled as such. No two boys are quite alike, and the very fact that the coach is studying the men all the time and is varying the work, depending on the way he has them sized up, is a necessary approach to the one thing which is so hard to get; namely, top mental condition for the race. The boy must trust the coach; the coach must trust the boy. Only with decent understanding between the athlete and coach may an athlete profit by the coach's experience and a coach gains more experience by his contact with the athlete involved. I am open to any suggestion which will help in a better understanding of what is going on in the boy's head - namely, how to arrive at proper mental attitude for competition and for hard work in practice.

In case the weather is bad, we may not report to the track, but will report out in the woods where we have protection from the wind. Conditions in the Michigan fall are quite beautiful - the leaves are turning, the air is crisp, and the men really enjoy their work. We add to the interest of our training after the first three weeks by going out each Monday to one of the many surrounding golf courses and just running. We pick up the men at four o'clock in a college bus, proceed to the golf course, and they are told to take 15 minutes to warm up. They spend that time in stretching calisthenics and in running back and forth, gradually getting into fast striding action. Then they are told to run continuously with an occasional pick-up for a certain length of time. Generally, the first assignment of this type of working is for 20 minutes. Late in the year the year the men do continuous running for as much as 50 minutes to one hour. This again depends on the boys involved. We split our squad as it becomes evident that some of the men are not up to keeping up with the leaders. We sometimes start the scrub squad around the course in the opposite direction from the good boys, with instructions that when they meet the good gang, they are to turn and follow them back to the starting place and then we turn them until they meet the second time, etc. The men enjoy this over distance, easy running on Mondays more than any other part of their work. They have a lot of fun with each other. Bill Jones may be an "also ran" this Monday but "top-kick" the next Monday. The boys say it depends on his disposition, and his disposition depends on whether or not they feed him hot dogs and chili at the dormitory.

Late in the year, before the final big ten days, the men are very much inclined to run all out on Monday. They call this separating the sheep from the goats or the men from the boys, and we let them go because by that time we pretty well know who the top seven men are and they get quite serious about the big meets coming up.

From what I have said up to date, I am sure you have noticed one thing - there is no substitute

for running. In order to be a runner, you have to run; there is no royal road to track and field perfection.

I am asked by coaches many times about timing training in cross country runners. We use the stop watch only for the beginnings of the race. Maybe once during the season we will run the first mile and try to hit the pace indicated on the course which we will expect to run. This will vary from about a 4:45 on a flat course to perhaps a little slower pace if we know we're running into rugged terrain during the first mile; but, generally speaking, if a man can be regulated so that he knows about what a 70 second quarter and a 2:20 half is, he will run a good race provided he is having a good day. After the men are out the first half mile, they know whether or not they are feeling right; if it's their day, they will start to push hard when the race is half over. Generally speaking, good cross country runners run the last half of their race about as fast as the first half. In fact, cross country is a perfect example of the fact that the longer the race, the evener the pace. In the last N. C. A. A., which was competed under the worst possible conditions, the miles were 4:45; 5:05; 5:15; 4:54. Had the weather been better, I am sure the third mile would have been held closer to pace.

Finally, may I use the I. C. A. A. A. A. as an illustration of training the proper timing. The I. C. A. A. A. A. course runs a straight quarter mile to a post, and you go around the post in a right angle turn. Imagine, if you can, 300 athletes lined up on an arc a quarter mile from a post - the gun goes off, and the thundering herd goes down across the field. There is always some eager beaver who leads the group around that post in about 55 seconds, closely followed by a lot of other over-eager boys. There is an old saying in track and field that you have to accept pace. That should be changed to the statement that you have to accept pace in reason. Before the I. C. A. A. A. A. we lay out a straight quarter mile stretch on grass and run it repeatedly until we are sure that the men know exactly what 65 seconds on a straightaway quarter is like. Then, the men are instructed to run that pace if it doesn't put them back farther than the first third of the field for, as stated, you have to accept pace in reason. We have worked consistently in this fashion for the past several years and have also impressed on the boys that they do not need to run on the pole in a long race - that is, stay away from that post that you have to go around. Stay out at least 10 feet so you don't get jammed. Try to run in 65 seconds if it doesn't throw you too far back in the field. When the boys follow these instructions, they find themselves stepping over and around the boys that were too fast, and they find themselves pretty much in the middle of the battle. If it is their day, at the end of the first mile, they start to pass the men in front of them - one by one - and once in front of them, they try to defend their position.

The N. C. A. A. at Michigan State is a smaller but higher quality field, and I have never seen this field go out in any fashion that was contrary to pretty good knowledge of pace. They generally go through the first half mile in about 2:15, which is fine for the late season, and the mile is generally run some place under 4:50, sometimes as fast as 4:40. To attempt to line out times for an entire cross country race is silly. Just start the men off as nearly right as you can arrange it, and have them remember at all times that race-consciousness after you're started is much more important than pace-consciousness. Whenever a man loses his race-consciousness by worrying about pace after the race is underway, he is doomed to disappointment.

CROSS COUNTRY FOR HIGH SCHOOL COACHES AS I SEE IT

By Forrest Jamieson
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FORWARD

A lot of us coaches are as naive as can be about this matter of getting information from books by "authorities, advice from experts, or simply conversation with someone who has been successful". We expect to get just about the same degree of fulfillment from such contacts as a person expects to get when he confidently hands his druggist the doctor's prescription for medicine. Successfulness, I suggest, cannot be stated in words by one person to be read by another with the expectation of a 100% translation as in the doctor's and druggist's case. The variables, obvious in coaching persons and not events, defy such simplification, yet many coaches believe that such blueprints are to be found. With this in mind allow me to state that what follows is most certainly not such a blueprint nor is it even remotely intended to be such. This paper is intended to serve as an "idea man" and it is hoped that what I have written will make the reader so dissatisfied with the content that he will attempt to explore the subject deeper and at a wiser source.

I have organized the material as I though it might interest a high school coach who knew little about cross country but who might like to give it a try. I am dogmatic in much of what I offer as opinion and I willingly admit that there are points that are debatable but this is not a doctoral thesis wherein I would give all sides to the question. The title is not an accident, although the paper could be; I would emphasize the "as I see it" portion. I sincerely hope that you get something from this, if nothing else, at least an argument for me to answer.

CROSS COUNTRY FROM AN ADMINISTRATION VIEW

A sport should not be introduced into the framework of any educational institution unless its purpose can be justified to the satisfaction of administrators, coaches, and participants. We shall divide our statements into two parts; one expressing the purpose of cross country as it might interest an administrator and the other expressing the purpose of cross country as it might interest a coach. For the sake of clarity the question-answer device will be used to present the ideas.

Question: "As an administrator I am interest in knowing exactly what educational values such a sport has for the boy?

Answer: Cross country is not a "glory sport". It would be unusual if more than a few score spectators were to witness a meet. The appeal of the sport has to be sold on a basis other than acclaim or popularity from the spectator point of view. We believe that this is important from an educational standpoint.

Cross country is a sport where slow, careful building and faithful adherence to training rules are accented. The boy under proper leadership soon learns that he is not "doing the coach a favor" when he gives up smoking, late hours, etc. He learns that he is often his own worst enemy. He learns to resist the desire to quit. He learns to respect WORK. This is all to say that the training program of such a sport can teach the participant the meaning of self-descipline.

Cross country teaches self-confidence, with self-discipline and a respect for work background servants. The participant learns that he is slowly but surely building himself. He realizes that there is nothing sensational about this growth, only that it is predicated on faithful adherence to daily training. We will risk making the statement that this sport is usually the only sport on the prep calendar that places more importance on consistent daily training than on that usual common denominator of athletic success, natural ability. The confidence that comes from this kind of experience is far different from that where circumstance or "luck" in a contest enhances self-confidence.

To summarize this briefly then; cross country teaches a respect for work, self-discipline, and self-confidence in an atmosphere more nearly resembling life. In education we attempt to teach those things and activities that have the greatest carry-over values. Not many of our charges will compete

before a group resembling an athletic spectator crowd in later life, but a good many will strive to do their best at some comparatively unheralded task and will need to call upon the lessons of respect for work, self-discipline, and self-confidence.

Question: Is this an expensive sport from the budget point of view?

Answer: The greatest cost involved is the cost of transportation. Cross country has the lowest per-capita cost of any sport on the athletic calendar. The boys buy their own shoes and use the track team's equipment.

Question: How can I best go about getting my principal to allow me to have a cross country team?

Answer: High school administrators are a reasonable lot on the whole, but whenever I think of asking something of them I am reminded of a former commanding officer that I had in the Navy. The minute that I stepped through the hatch leading into his cabin he would shout "NO!" and then in a soft growl would follow with, "Yes, Jamieson, what was it that you wanted?" Very few of us drop in on the boss to pass the time of day, we usually want something and there are a lot of excellent school administrators that follow this philosophy--the answer is "NO!" unless they can be convinced otherwise. What I am saying is that a good many administrators are going to say that big "NO" just about the moment that you walk through the door with a suggestion that cross country be added to the school's schedule of sports. You had better be prepared to convince the boss that the answer should be something besides a no. To do this you had better know something about this sport and something besides practical techniques; you had better know why you want this sport in the program and why from the standpoint of an educator, not just from a track coach's viewpoint. The boss can be sold, you know, even after he has said no!

Question: What are some of the arguments that you would use in attempting to sell a reluctant or skeptical administrator the idea of adding cross country to the school sports program?

Answer: I doubt that any high school coach could find a better opening argument than the one that came out of Washington within this past year. I refer to the special White House Conference dealing with the status of our national peacetime physical fitness. The grave concern of our Chief Executive for the apparent trend of our young people to become spectators instead of active participants is common knowledge to all of us in education. Those of us that are in public education at the secondary level are in the best position to answer this call to duty. Just what is our duty? It seems to me that we ought to be searching for more ways and means to offer wholesome, challenging athletic programs; programs that will extend athletic opportunity to new areas as well as increase the numbers of participants involved. It is my humble suggestion that certain sports, such as football, basketball, and baseball have reached a near-saturation point beyond which any appreciable amount of numerical expansion is impractical. I say this because I have witnessed athletic programs where mere school administration has placed a limit on the number of teams (varsity-junior varsity-freshman-sophomore) and the number of games that could be played. The nature of the other sports, baseball and basketball, places natural limits on the number of participants, etc. What we need is to offer new sports that will be attractive to young people. Such a sport is cross country. Its special appeal is that it extends opportunity to an entirely different type of youngster. This type of youngster defies being classified but by and large it can be said that he isn't the kind that is interested in football, either because of temperament or body structure, or both. Usually this lad is one that is neglected in the usual high school athletic program. The first three lads across the finish line in the California State Meet mile run (Larrieu, 4. 20. 1; Neal 4. 20. 4, and Monzingo 4. 20. 8) all weighed less than 135 pounds!

Question: Who will coach cross country if the track coach has to coach football?

Answer: The most important part of the cross country program is the leadership that is assigned to the sport. Usually the track coach is the one who will do the best job of coaching the sport because it will benefit his program and he will be able to translate the carry-over from cross country to track the following spring. If the track coach just simply cannot handle the team because of other fall sport commitment, and if there is a former distance runner on the faculty who would do the task, all may go well. If the track coach isn't particularly excited about cross country it would be just as well to forget about instituting the sport in your school. We say this reluctantly because there is always the chance that once the coach gets into the sport he will gain some insight into what is involved, but this is questionable. As much as we like cross country and would like to see it spread about, it has been our experience that it is best not to have a program at all unless the coach sees the purpose for such a program and knows how to interpret it in terms of young high school students. It is not a sport to be assigned just anyone merely because he happens to be available for a coaching period at a certain hour, etc. The program dies a quick death under such leadership.

Question: What would be wrong with coaching football and cross country at the same time?

Answer: The above statement has suggested what our answer might be to this question, but because there are so many coaches in small schools that have no other choice but to handle both sports at one time, a comment should be made concerning such a possibility. Our reaction is that the sport needs someone who will give all of his time to this kind of coaching. Regardless of what others may think, coaching this sport involves leadership more than any other element. Leadership cannot be effected when the leader is absent. Of course, you can tell your men to do certain tasks and then walk off and leave them. Also, it is true that any amount of running is going to be more constructive than none at all. But the important thing is that you do not know your man and what his peculiarities are unless you watch him over a reasonable period of time. This is an individual sport and it involves a coach knowing each participant as well as he can. The short answer to the above is, yes, you can coach both sports, but do not expect too much from your cross country team, or better yet, don't expect to build much interest in your sport because cross country will flourish only with personal coaching attention. It is too demanding a taskmaster to expect youngsters who are taking an initial interest in the sport to discipline themselves without careful, on the spot, observant leadership. Yet, some running in the fall is better than none at all, so if you can't manage it any other way, you have no choice but to hope that one of the participants will offer the leadership.

Question: Won't all this training, two months in the fall, and then almost three months in the spring cause the participant to become stale?

Answer: The answer to this question is one that holds the key to the whole matter of cross country and how practical it is for the high school program. There are a good many people in the coaching profession that claim to be concerned about overworking youngsters. They place age-limits, time limits, weight limits, and in general by their application of these limitations suggest that it is necessary to keep an ever-careful eye out for that demon coach will "exploit" his charges and undermine their health by asking them to do tasks that are too far above their capabilities, etc. This amounts to a negative philosophy in that such restrictions are legislated to take care of the boy who is in poor health. It is a philosophy of leaning over backward so as to be careful not to harm anyone and in so doing this harms the great number of youngsters who need a positive, yes, even aggressive type of program for their physical development. Now this doesn't mean that we are the "rugged individualist school" that suggests "throw them in the water and let them sink or swim". We do believe that youngsters today need to be more active in their athletic lives because they are not engaged in anything approaching physical labor in their home lives. For us to further this condition by over-protecting them amounts to a national crime on the part of many of us who claim to be "physical education experts". The fact that we now have more boys today in this country setting marks in running events than were ever though possible in the days before the automobile became so much a part of a high school boy's life, is evidence that young people readily accept the challenge of hard training and that there are coaches ready to preach the philosophy of work.

We believe that a youngster must be brought about slowly to realize that work is the answer to much of his probable success. We usually tell our newcomers about the man who lifted a new-born calf at birth and thereafter each day until some months later he was amazedto note thathe was able to lift a weight much greater than he thought he was capable of lifting. So it is with cross country. We start slowly and build a little at a time. After even two weeks the participant is surprised to look back upon his first workouts which once seemed "hard", etc. What has this to do with going stale? Simply this. If a careful base is built underneath a participant it is the best insurance against him going stale that we know of, assuming that "stale" means to go considerably beneath a certain established level of achievement. The more time that is put into training the less the possibility of a boy becoming a victim of "staleness" which after all may be called a plateau of mental and physical achievement. Mental attitude is extremely important to the participant in cross country. He, the participant, must feel that he is achieving a growth of a personal nature. Read the question on weight-lifting for a better illustration of this point.

Question: What about an age-limit concerning participation in cross country?

Answer: We would no more place an age limitation on participation in cross country than we would on basketball, swimming or regular track events. The emphasis should be upon the leadership (coaches) not to ask a boy to run in a competition that will discourage the boy. The boy just won't be able to keep up with a mature lad if he is immature. The damage that will be greatest will be the psychological damage and not any physiological harm. The young lad just stops running when he gets tired. We attempt to keep novice runners competing in their own class.

Question: How do you go about getting a team started if the sport is new to your school?

Answer: In the first place, don't expect miracles in the way of results the first year that you institute the sport. A lot of groundwork has been already done for you in that the mile run is the favorite track and field event of the American public, (I'll wager that more has been written in American sport pages about the mile run and mile runners than about the four next most popular track events and their record-holders).

A lot depends on what kind of opportunity one has to introduce the subject of cross country. What we need is a short, documentary film on the history of the mile run. Such a film could be shown before an entire student body and could be followed up with a film on the importance of cross country training and relating it to success in the distance and middle-distance events. Without this, however, any kind of meeting is essential to spread this word. I have talked with junior high students just prior to their entering our senior high school (they all know about Landy, Bannister, and now Bailey). My talk is usually very general and not technical at all; it is intended to inspire some youngster to accept the challenge of running and to begin that challenge by going out for cross country in the fall of the year. We must be salemen! We must be proud of the product that we are selling. Youngsters are waiting to be sold; they have been in contact with indifference or with the attitude of mild interest that borders on indifference, enough to know that or sense that it usually spells mediocrity. They want to work with someone that has enthusiam and who wants to help them do something for themselves. Our youngsters are not the automobile-mad group that they are so often presented to be in caricature. They are, by and large, ready and willing to work and to achieve but they need someone that has confidence in what he is doing and confidence in the ideal that young people are worth believing in, etc. I had a splendid group of young men to work with this past year; they worked as I doubt any other group of high school lads ever worked before, yet, if anyone were to ask what they had in common, I would be forced to admit that they were such individuals that the only thing that they had in common was that each one had his own personal automobile! I cannot be convinced that the automobile routine that we hear so much need be a negative problem for our young people.

The above brings us to the point--just what are we trying to sell as salesmen? Are we trying to sell cross country because it is a necessary aid to building faster milers, or are we trying to sell the sport because the President recently reminded us that as leaders of young people we owe an obligation to our national welfare that may be answered by offering the sport as a check against a growing tendency for our young population to become less interested in athletic competition? I would not refute the fact that either of the two above reasons is important within certain narrow, restricted viewpoints, but I prefer to believe that I am a salesman of SELF-CONFIDENCE, SELF-DISCIPLINE, AND RESPECT for HARD WORK to young people who need these commodities very desperately in this highly competitive society of ours.

Oh, yes, what are the specific ways to get men out? Posters. Talk to youngsters in P. E. classes. One year I waited at the bicycle rack in the morning and asked each lad how long he had been riding his bike. I am not sure that there is any great correlation between bicycle riding and cross country success but by asking some of the boys and telling them that I was looking for lads that were active, I came up with a few prospects.

The bicycle idea is almost a desperation method, I admit, but someone starting out may find it useful. It is strictly a first year measure as far as I am concerned.

Now that I am in the regular physical education department I have better opportunities to watch out for potential candidates. Another item, and one that I had nothing to do with starting, has to do with a practice that we have in our physical education classes. We have a pre-conditioning period of some two weeks for all of our classes. After a doctor's check-up the first week of school we start all of our lads through a certain basic program of conditioning and classifying them. One of the things that we require is for them to do some running because it is obvious that any physical activity is predicated on a running base. We have a short period of calisthenics and then we have them run around a certain area (in our case a 540 yard practice field) and ask them to run for two minutes without stopping, if they can. In this way we do not insist upon a certain distance, but merely blow the whistle at the start of the two minutes period and blow the whistle again at the end of the period. We very purposely refrain from setting any limits or minimum requirements in these warm-up runs. The idea is to be as permissive as possible because you will have some lads in the class (the very stout lads, etc) that will not take to running because of a traditional dislike for running as such. We have discovered that about ten percent of the class will be conscientious and will put everything into whatever they are asked to do. These boys will compete at every opportunity and these are the boys that you should be on the lookout for in such a P. E. activity. We usually increase the time limit from two-minutes up to three and then by the end of the pre-conditioning period a four minute period of continuous running. The boys that don't care too much about competing may still be walking and running at the initial two minute rate at this time. I have discovered some very talented youngsters with this kind of set-up, but not 100% recruiting. I usually mention cross country to

these lads that do well, but the very name "cross country" frightens them and I know that there is a lot of talent that we are not utilizing. If you have such a program it will be very productive in its selectivity by and large.

The best method of getting youngsters out takes place after you have established the sport and this involves the members of the cross country team doing the recruiting for you. They usually are in a much better position to know all elements of cross country requirements after a year on the team and they also know their peers better than you do and can fairly accurately judge whether a lad can do the physical work required and whether he has the proper mental potential. Of all systems of selectivity I consider this most effective. The only thing that the coach need do is to constantly be after the members on the team to get new members. I will be starting out again to build again this year (Five out of my first seven cross country men were seniors) and I am thinking seriously of setting up a special award for the member of the team that can bring in the most recruits, etc.

Question: Where do you work out if you do not have a park nearby?

Answer: The best answer to this depends on a lot of things. First, if it is possible, you should attempt to find a place that will afford your runners a soft running cushion underfoot. This will be explored in another question but suffice to say that it is desirable if you can obtain it. If you can't have it, then try the next best thing, of course. We use the outside perimeter of a large football practice field. We don't get in the way of the football players, nor they in ours because we use only the outside area--the grassiest area outside. If you have no other place the inside of your football field will be sufficient although it would be ideal if you could use a park where there is a long stretch of grassy meadow and gently rolling terrain, etc, but only one high school in a hundred is located so fortunately. One thing is certain, a coach that is determined to have cross country will have the sport no matter what discouraging obstacles appear on the surface, and on the other hand, the indifferent coach will allow the best facilities to go a-wasting!

Training for cross country is one thing; you can train during the week on the high school football practice field, but where are you to hold your cross country runs? If you hold them on the school grounds proper the chances are that you will have keep circling a lot to prevent the course from crossing paved streets, etc. Some coaches tell me that the only way to make cross country attractive is to hold the meets on the school grounds proper and have them start and finish before and during the halves of the home football games. This, they argue, allows more persons to witness the spectacle and enhances interest in the sport. I violently disagree with such reasoning, personally, and for the following reasons. I feel that by having cross country offered at half-time to a football game you are placing cross country in the position of being a poor man's sport, another form of entertainment to compete with the song-leaders and pom-pom girls for attention. in offering the sport within such a framework you place an importance upon the spectator value of the sport. Cross country is not intended to be a spectator sport--that is one of the items that dignifies the sport as being something different and apart from such sports as football and basketball. Cross country deserves its own special atmosphere and that special atmosphere is not necessarily built around spectators or the lack of them. In this section of California we have instituted what we call "cross country centers". A cross country center is a special locale that is especially adapted to the aims of cross country running. It offers changing scenery, a run over a grassy surface, with only slight, rolling hills, etc. We have asked various golf courses to allow us to hold a cross country center once a year (Stanford University offers their facilities to Northern California high schools on four different occasions), usually on a Thursday. We have as many as twelve to fifteen schools attend these centers and have the competition broken into different categories (Varsity-junior varsity, and Freshman-Sophomore) and into different heats. By scheduling different centers in different geographical areas we are able to have as many as 700 participants vieing on a single Thursday afternoon. By not asking any one golf course to put up with the kind of organized chaos that such an affair entails, we can usually expect to find a fair number of locales brave enough to chance us on such an infrequent basis. We feel that having a cross country meet on such courses and with such an atmosphere of interest (in some cases, almost two hundred cross country runners at one center) the cross country athlete feels a pride in his sport and a feeling of dignity that could not be had if he were part of a second-hand spectacle such as he would be running between the halves of a football game.

Question: How do you get them started once you get them out?

Answer: As we mentioned before, a principal object in cross country coaching is to get young people to gain insight into what their own real capabilities are, i.e., self-confidence. We start out with an easy program. We usually ask these lads to run a 4-4-4 arrangement with light weight lifting interspersed in the first rest period and rope-climbing in the second rest period. By 4-4-4, I mean that we ask them to run four minutes without stopping. No special pace and no special distance to cover, yet you should put them over a measured course instead of letting them run about aimlessly in any old direction. After the first four minute period you have a 20-25 minute rest period before attempting the second four

minute period of continous running. The same 20-25 rest period between the second and third (or last) four minute session is recommended to start with. As stated before, we have them push weights during the first rest period and clim the rope during the second respite. What weights do we ask them to lift? We ask them to lift the bar bells with 45-55 pounds as many times as they can before they start to strain or use their legs to "kick" up the weight. Then they stop, pass the weight on to another mate (I have three sets of bar bells and plan to get more) who does likewise. Each person should press these weights in sets of three and with the number of repetitions determined by his first non-straining effort (first set). The weight should be pressed from a standing position and from chest to directly overhead with the elbows completely locking and unlocking with each repetition. We do not want the lad to strain in doing these because we are interested only in building muscle tone and not in building the size of the muscle. By doing them fast and without strain he should achieve muscle tone. Even without an attempt at doing these repetitions with a straining effort, the lad will naturally build up his repetition-count over a period of days.

The rope climb is another item that we believe in because it also builds two-sided strengths. Being right-handed or left-handed is fine for football, basketball, or baseball players, but in running one uses the left side of his upper body as much as the right side and fatigue will creep in wherever the body is weakest.

We keep pushing up the total minute count little by little. We do not set up an unrelenting schedule of progression because we may find that a certain day is too humid for a tough workout and we will relent from our goal of ever-increasing running requirements for a day or even two or three days. We wouldn't have all the boys moving at a lock-step pace either. Some boys might be on a pattern of 8-8-6, while some of the slower developers would be at 6-6-4, etc. We have stated often enough that we believe in work, yet we hasten to add at this point that the amount of work done must always be a matter of judgement on the coach's part. That is why a coach must always be on hand--so that he can be able to observe and by experienced observation gain insight into the capabilities of his boys. The more that he is around them the more he learns about their potential and limitations, etc. Last year we had what I honestly consider to be the best high school cross country unit ever to represent a secondary school in the history of our country. We were running 14-12-14 sets in December. I should explain that as time goes on and you progress from the original 4-4-4 plan you begin to "put the screws on" little by little. You ask that they cover a certain distance, you add more minutes to their elapsed running total time, you cut down or compress the rest-period intervals. Mainly you are interested in the amount of mileage covered along with the amount of total elapsed time. You want them near the end of the cross country season to cover at least five miles of distance in at least 30 minutes of running. Add to this the little game of modified touch tackle that we play after each workout and you have somewhat of an idea of what we do in the fall.

Question: Just how important is a grass surface for training as compared with training on a running track?

Answer: The idea of running on the grass for training and for cross country is certainly not a new one; not even a modern one, but the Swedish athletes were the first to use a system (Fartlek) that made an issue of this point. Other training programs have endorsed this principle and I am certain that there isn't a worthwhile training program that doesn't insist upon grass or soft surface as a must in its basic tenets. I first read about Fartlek in Track and Field News back in 1949 and ever since that time I have been a great subscriber to this practice. We do not run ANY kind of practice on the running track any more. I mean exactly that--none! The only time that our boys run on a track is the day of a meet. I usually attempt to put over this idea to the boys by pulling out a rubber band and calling their attention to it. I'll say:

> "See this rubber band? (Stretch rubber band until it becomes quit taut). How long do you suppose that this band will last if I keep this tension on it? Fairly long, eh? Well, how much longer would it last if I were to do this to it (Loosen the rubber until it becomes slack and then tighten it again, repeating the process of tightening and loosening it while talking)? It will last many more times as long if I give it even brief opportunities to recover its elasticity, won't it? So it is with your leg muscles. You must give the muscles a chance to recover in about the same manner. Running on a softer, more resilient surface will allow the muscle a better chance to recover than if required to work constantly over a harder surface."

It has been my experience with young boys that leg troubles are a main factor in impeding progress--what I mean is that the younger the runner the more important is this factor of leg trouble, etc. I have noticed less leg troubles and a greater ability to absorb more work assignments; hence a noticeable gain in strength over an even shorter period of time then when I trained them over harder running surfaces. I discovered that the muscle could take a much greater percentage of work depending on when the last time the grassy practice field was watered. When it dried out just a little the boys would start to complain. Now we welcome the day that the maintenance man waters the football field with adjoining track or the

practice field. We used to worry about him getting the running track too wet with a runaway sprinkler, etc, now he can't get the grassy area too wet--well, not quite, anyhow.

A young man from a small high school north of here just ran a 1.53.8 half-mile in our recent State Meet. This is a remarkable time for any lad but some of the coaches thought it was all the more exceptional because the lad's high school didn't have a running track! I claim that it was the best thing that ever happened to that young man. He was "forced" to run over a fairly good growth of grassy surface for his daily training program. I don't know where the lad will attend college or university but it wouldn't surprise me to learn that he will come up with his first leg troubles when he attends some well-equipped school!

Another thing that I have observed is that running barefooted is not such a bad idea if you have a surface that will allow it. I can't tell you why I believe that this is a good training device, but four of my top five distance runners seemed to get some value from it. I could be that the canvas and rubber type warm-up shoes create too many blisters or at least tire the feet in some way. This year we did a lot of running and it was a rare workout that involved less than five miles of workout. This added work probably made their feet tougher. Anyhow I know that they seemed to enjoy running better running barefooted than with the traditional type footwear. Of course you must realize that we do run over a very well grassed area that is free of glass; it is nothing like crossing a wheat stubble field barefooted but after three months or so of this running, the feet do get rather callous.

Question: Just how practical is all talk about weight-lifting for distance runners; in other words, is this just another "fad" or is there really something to it?

Answer: We believe that there are tremendous training possibilities to be found in weight-lifting for training distance men. However, it isn't a subject that can be covered without a considerable background.

One has to be acquainted with the effect of the European training psychology that started with Fartlek and is being reinforced by Stampfl. We cannot condense all of the important principles of distance training into a few sentences. It has taken over a decade for some of them to be tried and tested and attempting to describe these ideas by simplifying them, causes a lot to be lost in the translation. If what follows could be called a translation. We should say, however, that the greatest change in training distance men took place when the emphasis in coaching changed from one of a coach telling a participant everything about his training schedule to one where the coach became almost a manager and the participant became his own coach in many respects. The coach became an advisor and not "the know it all" and the participant became more self-sufficient and dependent upon his own intellect, etc. Fartlek was a beginning of the self-descipline type of training that the Swedes startled the world with, Gunder Haag, etc. The English have mass-produced a kind of training that has borrowed some from Fartlek and added some new principles. All of these European training devices or training schemes have this in common. The participant believes in the value of careful building. He believes in himself rather than in a coach or "expert". He builds up a feeling of self confidence at the same time that he is building himself physically. The strongest point in the European system of distance training has to do with this idea of the runners' attitude.

The question above has to do with weight-lifting and how practical it is or is not to high school lads. This is how it fits in with the European principles. Most young boys have already determined their running potential by the amount of activity that they have known in the first thirteen or fourteen years of their lives. This is true only up to a certain point, of course. If a youngster has been sickly and therefore relatively inactive as regards to normal playground activities, etc., the chances of his being able to withstand the physical or psychological demands of a hard-work program are slight. If the youngster has been at least normally active during his infancy, early childhood and grade-school days there is every reason to believe that a careful building program will prove challenging and at the same time effective and beneficial. Each youngster is different, as we all know, and some may achieve more "naturally" than others. Some lads differ not only in physical equipment but also in their own awareness of their potential. It is the coach's task to not only build the physical powers of his charges but also to help his charges become aware of their, you might say, "hidden" strengths. This cannot be achieved by assigning all of the members of your group the same kind of work, day after day. All that this does is to allow the coach to observe who has the best physical powers by the mere use of a stop watch and that is something that even a sophomore manager could do as well. What the coach wants to do is to get the various individuals to become aware of some of their strengths. Many of them have abilities that they never dreamed of. Weight-lifting is a useful device to get some of the youngsters to realize this insight or self-confidence. Let us explain how we use weight-lifting in our cross country training. We first start the boys out by having them cover a lot of territory by alternately walking and running. The next day we hope that they will report that they are a little sore so that we may tell them, "Good, that's what we like to hear, now we know that it's doings some good, etc." We don't want them to be too sore, just enough to satisfy them that they have done something. We always try from the beginning to laugh off the complainer and the whimperer so

that the men soon get the idea that complaining is not in keeping with the group spirit. We have found that it is always wise to have a little game of "touch" football before giving up the day. It is something that most of them will look forward to and it has its own method of madness too. We play a kind of game which requires a lot of running. We choose sides and have what amounts to a game of man-to-man touch football. We do not allow the passer to be rushed and this allows him to wait until someone is in the clear before he throws the ball. Sometimes the passer will wait five minutes or more before he sees someone clear enough to throw to. Because we do not want any physical contact we do not allow any blocking and a "one-hand-touch" anywhere on the body keeps down the possibility of injury. This game is used in the middle of the season when the boys have covered three or five miles of workouts. It is enlightening to see these boys really run pell-mell who only ten minutes or so before complained about the routine workout. The moment that THEY become aware that they are doing this after a difficult workout is the moment that they begin to realize confidence in themselves. We have weights out for the boys and tell them that weight-lifting is essential to running because we run with our entire body not just our legs. Tiredness in the shoulders can make a runner stop a lot sooner than tiredness in the legs, etc. We keep a chart on the number of times that he (the participant) does each weight-lifting operation. We point out to him that most of us are stronger in the legs than we are in the trunk and for that reason we want to work on the part of body that fatigue will attack first. Naturally each boy will be able to do certain things at a certain rate. We are not concerned with the figure other than to point out to the individual that as each day passes he is getting stronger and stronger. We know that he will gradually improve with the weights and because it is a tangible and measureable thing it is something that a youngster can understand and interpret. He will also progress with his ability to run further each day at an increasingly faster rate. With the careful supervision of the coach the participant that is just starting out will begin to have confidence in himself. It is not that the weight-lifting and running have done so much for him physically as it is that psychologically he is now beginning to become aware of his own strength. You as a coach could talk to him all day about how strong you think he is, etc., but it will never have the impact that the self-knowledge would give. So, in a few words, weight-lifting, as we use it, has its greatest value in that it removes the doubt and lack of confidence so many of the lads have. You do not give them a special "trick", you merely place in THEIR hands the key that should unlock their real abilities. The pathetic thing about many of the boys that we have is that they have this strength, have had for a time, are not aware of it, would not believe anyone who might by pure luck suspect that they had it and told them about it, etc. Weight-lifting, rope-climbing, push-ups, pull-ups, leg-lifts, all of these things can be used by the coach to realize the important ingredient of SELF-CONFIDENCE which is the most important factor in each cross country participant's degree of success.

Question: What do you recommend in the way of teaching style to either cross country or distance men?

Answer: I am not a devotee of "form" running. At least not for high school athletes. I have listened to coaches yell at their men to do one thing or another with their arms, body lean, etc., but I am personally convinced that they are harming their charges instead of helping them. I have a lot of faith in the ability of the human body to compensate if it is given enough time to. Whenever I have a sophomore quarter-miler or a distance man that appears to be violating some precious tenet of what we as coaches consider to be "correct" form or orthodox, I try very hard to keep my mouth shut for the time being. I usually wait until the cross country season following that track season before I expect to get results concerning the best "form" from such obvious violators. It is my opinion that if you have a boy run enough miles he will come up with an economical style of running--economical to him. How many of you remember Gil Dodds and his threshing machine style? They tell me that Zatopek is another that defies the believers in orthodoxy. If a boy does enough running, and if the boy has normal powers of adjustment he will learn of himself to use his equipment with an efficiency adjustment ability that defies such absurdities as coaches "teaching" style. I believe that if you have a boy run enough miles over a period of time and under enough conditions wherein he will have had sufficient opportunities to test his adaptive powers, he will come up with the best and only style suitable for him. Style is something that we as coaches ought not to fool with as much as we do. If we were to get our charges to work more and put in more time on the event the matter of style would solve itself in many cases. I know that the purists of form will insist that an error has to be corrected as soon as possible and the "right" form instilled thereafter. These people underestimate the capacity of the human body to compensate. I say forget about style in running, just get them out there andkeep themrunning, running, running!

Question: Just what kind of training to you use during the early months of spring just before the season starts, etc?

Answer: We start the boys all over again with the same kind of work that they originally started the cross country season with in the early fall. The only difference is that we don't go as far back as 4-4-4. We probably will be doing a 10-12-10 after they have had a week of just running about getting

adjusted from a four to six week lay-off over the end of cross country and the start of the spring season. The same theories are followed; all of the work on the grass; absolutely no work on speed as such. We institute a kind of modified Fartlek-type exercise that we run on the inside of our quarter-mile track. This is possible for us because we have a level infield of grass inside the curb of our track. Thus we "make" another track on this inside curb by setting off about six feet in from the curb all around the oval and setting off the area with hurdles and use it in the same fashion as the "inside" track of sawdust and soil that you see here at Edwards Field. It is around this inside "grass" track that we run our modified Fartlek-type exercise. This exercise consists of eight minutes of continuous running. We start off with a whistle and have them run two minutes at a certain set, moderate pace; at two minutes I blow the whistle and they are to sprint at top or near-top speed for about fifty yards, after which they are to return to their own previous pace of before the sprint; they do this again at four minutes, that is, sprint for 50 yards, then return to pace; again at six minutes for the third and last sprint and back to normal pace until eight minutes at which time they have completed their exercise. We used to think it was unusual for a boy to cover six laps in eight minutes and because of this the boys on their own formed a "white cap" club. To become a member of this club a runner had to be able to do six-laps in eight minutes in the manner described; once a member the runner had the right to wear a white cap to practice. The six-lap or "white-cap"club" has become so cluttered with new members that the boys are now talking of making it a 6-1/4 lap requirement for membership. This year our top six cross country boys covered over 6-1/2 laps and we had 12 members in the white-cap club altogether.

We also use a golfometer (a pedometer designed to measure the distance of golfers' drives on the golf course in terms of yards). We place one of these on a boy and (place it on his hip after making a standard adjustment over a 440 track at his approximate cross country stride) encourage him to see how much yardage he can roll up in 10, 15 or 20 minutes. We are going to get a number of these and see if we can't get up some kind of game involving sides or team competition using these instruments as a stimulus. Anything that can be made into a challenging and interesting games help to sell the training program.

I am whole heartedly a believer in over-distance type of training as opposed to the under-distance type of training. I would have the milers running two miles for time before timing them in a mile run, if that is their event. I would have a half-miler run a mile before going down to the half, etc. We do not work on speed as such and yet we have never noticed that speed was missing from our performances in actual competition. In early March of this year we had Ron Larrieu (State C. I. F. mile champ at 4. 20. 1) run a 5,000 meter race in 15. 24. 0. He passed the 3-mile mark in 14. 59 and wound up with considerable speed as the time differential for the 188 yards indicates. That Friday we put him in a 440 event and had him run two 220's. His quarter time was 50. 7 and his 220 a 22. 5. A week later between running two-mile races in 9. 39. 3 and 9. 39. 0, Larrieu ran 440's in our regular dual meet engagements in 50. 1 and 50. 4 (he ran a 22. 3 furlong, also). This lad's fastest time the year before was over 52. 0 and 23. 8 for the 220. We didn't give him anything but over-distance, no speed work of any kind; he would run these short races in the dual meets and train over long hauls only. This was essentially the same experience for four of our other top lads. Tom Cathcart (4. 25. 2 mile, 1. 57. 2-880, 9. 56. 0 2-mile) ran a 52. 0 440 not many days after his 9. 56. 0 two-mile stint. John Morrison (4. 28. 3 mile, 2. 00. 9 half-mile, 9. 51. 8 2-mile) was the shortest one on speed with a 53. 2 quarter but he ran that when we were running over-distance just before starting into interval running in April. I have an idea that John would have been under 52 if we'd tried him just before the State Meet. Dean Satterlee (4. 40. 2- 1. 59. 2) ran his fastest 440 (50. 9) soon after training over long-distance. Satterlee wasn't with us until January inasmuch as he transferred to us from another school mid-way in his senior year. We started him on our over-distance diet in January and he responded very well to it. Bill Whitson (4. 36. 8- 2. 01. 5) was the only junior in the group and the only one that didn't really run a 440 time that his distance times would promise (53. 4) but he is still growing and I have toremember that Larrieu's time at Bill's age was a 56. 0- 440, etc. We had two other lads in school that ran miles in 4. 45. 0 or over, and a 14 year-old lad who ran a 3. 22. 8- 1320 yard race. They all seemed to flourish under the long-distance approach.

Question: What are some other considerations that have an especially important part to play in high school cross country training?

Answer: I don't know of any single item more important than work unless it is rest after that work! Remember, we are now talking about cross country for high school lads that are in the process of growing. They must understand that sleep and rest is not like a bank where they deposit and draw out hours of sleep as if it were like a checking account. High school boys in the United States lead very active social and academic lives and a trying athletic life added to these two makes getting enough rest a problem. The fact is that they can get rest but it is an item that cannot be overlooked in any discussion of training boys in our country. The coach should make an effort to look into the rest habits of each of his men--he will forestall a lot of future illness if he does this. This illness will invariably show up in the form of some kind of respiratory ailment. Another item that I insist on is that all of the boys get to bed early the night of the afternoon that they compete. I repeat, the night of the day that they run--not the

night before the race. Boys that are tired and who stay up late when they are tired are placing their physical fitness in jeopardy. I constantly hammer on two items, WORK and REST.

Question: How do you account for the fact that some schools and coaches get little continuity out of cross country programs for spring track use?

Answer: This means that a man did well in cross country but never accomplished as much in track as his work in cross country indicated he might, right? Well, there are a number of things to consider. Let us take examples of whole teams rather than of individuals if we want to give one reason. Sometimes the cross country coach in fall is not the same person who has them in the spring. A lot of coaching insight is lost with this lack of coaching continuity. How about a special case of a boy not doing well in the spring after doing well in the fall? In almost every such instance you will find that such a lad is one that is lacking in speed ability. You will find the opposite true in more cases than this one just mentioned--a lad becomes good in spring track after a not-so-hot cross country season. This last year the best in four important C. I. F. sections met on one course so that times and efforts could be compared. I have listed the top ten and their best mile and/or 880 times, and then for comparison I have listed ten lads outside the first ten who did very well in spring track. These marks involve Northern California lads only, and I am certain that a check of Southern California records would closely duplicate opportunities above.

RANK	NAME	CROSS COUNTRY TIME	MILE/ or 880	RANK	NAME	CROSS COUNTRY TIME	MILE
1.	Larrieu	10:12	4.20.1/1.57.	13th	Spillman	10:28	4.24.5
2.	Jent (Jr)	10:16	3.15.5 (3/4)	26th	Lee (Jr)	10:43	3.16.9
3.	Chavex (Jr)	10:17	4.32.0	28th	Woods	10:45	1.58.5
4.	Beardall	10:17	4.34.0	33rd	Wallace (Jr)	10:50	4.25.2
5.	Eisenman	10:17	4.28.7	36th	Brown	10:50	1.54.4
6.	Belcher (Jr)	10:21	1.56.6	37th	Dorsey	10:51	47.3
7.	Cloe	10:21	4.22.8	43rd	Ray	10:55	1.58.3
8.	Hammond (Jr)	10:21	4.23.8	53rd	Wood	11:01	1.54.6
9.	Cathcart	10:21	4.25.2/1.57.2				
10.	Morrison	10:22	4.28.3				

Question: What practical things can we do to achieve an optimum in high school coaching?

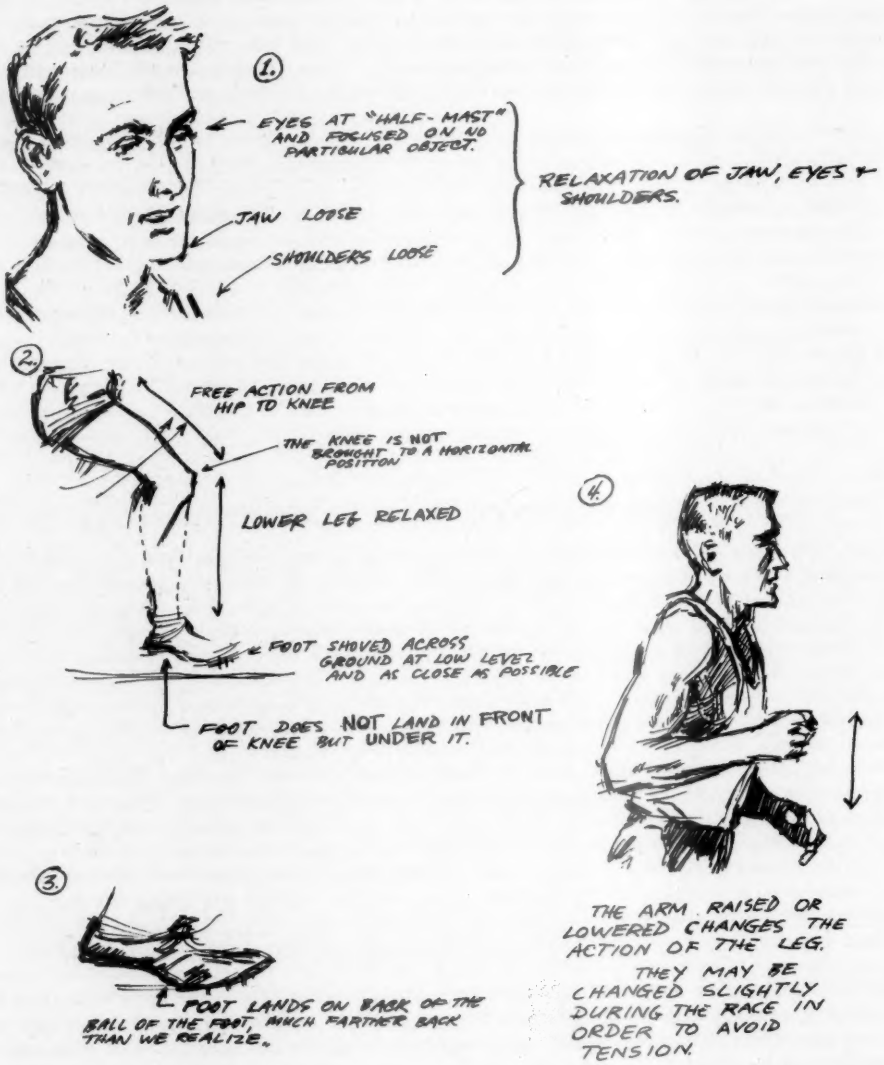
Answer: We can do one thing that is very important in my opinion. We can stop being our athletes' worst enemy! We had better stop talking about a 4.20.0 mile like it was something to boast about. It isn't! English lads of 18 can do much better than our boys because they have really put a different approach to running into effect. Ron Clarke of Australia ran a mile in 4.06.0 and a 8.56.0 two-mile while an 18 year old lad. Let's stop talking about the two-mile as if it were a form of social disease. Let's have a few of these races during our season (track season). A two mile run for high school lads is the next logical step in our development. We know that it is the only race for certain younger runners that don't have speed. We have to resist the people who claim that a long race is tougher on a young lad than a shorter more intense distance. This is not the truth and we all know it.

We need to have more and more distance relay marks activated into the framework of interscholastic recognition. If we are to make distance running attractive we should have several relay events offered up for national recognition that involve at least a mile as one of the distances. I suggest that we offer more relays such as the distance medley (440-880-1320-mile) and the four-mile relay as events in our relay meets. At the present time the two-mile relay is the longest distance event that the National Federation recognizes formally--we can hardly build distance interest without providing for our high school milers in some relay event, can we?

We need to provide our youngsters with these listed to learn about the sport in other ways than by our contact with them. I have found that Track and Field News is a terrific motivator of interest. The lads pick up the language of track and field in no time after reading this track man's monthly bible. The contests that Track and Field News puts on has caused about 20 lads on my squad to buy this paper and I am certain that about 15 to 20 of my squad will be up here to watch the meet Saturday because of Track and Field News build-up of the meet over the past 3 issues. A high school coach would do well to introduce this little paper into his sports library as a professional tool.

Q. What do you regard as good pace?

A. The coach and runner must work out the schedule which will vary with the course run, whether it is flat or hilly, but under ideal conditions the fractional time for every mile should be the same. Usually this is not possible. The coach, of course, figures the per mile schedule on the basis of the past performances of his man.



MARATHON RUNNING

By Otto Szymiczek
Greece

I am pleased and honored to stand in front of you this morning. I am pleased, because I have the opportunity to bring to you warm greetings from Greece as a token to the International Brotherhood of the Athletic World.

On the other hand, I am honored because as a member of the First International Track and Field Coaches Clinic, I have the privilege to address the most selected groups of athletic experts of the world.

When in 1894 the Frenchman Pierre de Coubertin conceived the idea of reviving for the benefit of the youth of the world the ancient Olympic games, a new event appeared in the program, an event which, although it had birth back in 490 B. C., never before was held officially as such.

This event was named The Marathon race from the classic distance of 40 KM. separating the battlefield near the village of Marathon from Athens, which was run by the warrior Phidippides in order to announce to the Athenian people the victory of their sons over the Persians. For the sake of history we may mention the name of the Frenchman Michael Breal who made the proposal for the inclusion of this new event.

Perhaps few were those that could imagine the great popularity that was to follow the development of the Marathon race, which already from the first time gave the winner greater glory than any other event.

Indeed, I should say that the Marathon runner certainly deserved the greatest admiration. His preparation as well as his race need the maximum of determination, body condition, willpower, discipline and mental alertness.

We don't really know at present the limits of human abilities. From the continuous improvement of Marathon performances we might say that the limits have not been reached. The human body contains a great amount of endurance which can be brought to light if the necessary prerequisites are present. These could be either because of external conditions such as acute danger, of the results of a mental disposition for the achievement of a set target. [According to my experience, the most important role in Marathon running is played by that mental disposition which empowers the runner to overcome his fatigue.] [Undoubtedly, a conscientious and scientific preparation plays its role because putting the body in good condition and improving running ability sets the point of fatigue in a later stage.] The importance of the mental disposition and determination which I have mentioned, is illustrated in the Marathon race by examples of many great runners, who, having exhausted the last drops of body reserves, continue to run solely because of their mental disposition, and sometimes collapse a few yards before the finish line after losing every sense of orientation and self control. In the Marathon race of the Olympics in 1908, the Italian Dorando, in the Olympics of 1936, the Argentine Zabala, of 1948, the Belgium Gailly and Peters in the Empire games of 1954 as well as many others are clear illustrations of what I have said.

It is touching to notice that athletic fans do not neglect to give credit for such admirable efforts, which although they do not manage to make the runner win the race, present a clear picture of his willpower and effort.

The running ability needed for the Marathon race is not acquired overnight. It is the product of long and hard training. This training, however, does not have to be planned. There are some examples which show that certain athletes, because of their mode of living, have developed that ability although they had never turned to a coach or a club.

Sp. Louis the winner of the first Marathon race in the history of athletics in the first Olympic games in 1896 ran only once in his life. But his running ability had been developed because of his occupation. I had the opportunity to meet him and he told me that from a very young age, he used to carry with his mule, fresh water from one village to Athens twice a day, a distance of approximately six miles each way and because of the competition with others who were doing the same job, he had to run. By the time he was 23 he had the necessary running ability. It is well known also, that the successful appearance in long distances by the Finnish is to a great extent attributed to the living conditions of the people.

I would like to consider with you certain questions as regards the selection of runners and coaching for and in the race.

If there is a possibility of choice I would tend to choose for Marathon runners, persons with light body frame, natural resistance and calm disciplined character. I would consider it an advantage if the runner has an occupation which enables him not to sit down during working hours or if he works outdoors. That can give him the opportunity to train while working. There is no need to mention that perfect health is necessary.

As regards the age. I am aware of differences in temperament and physique between persons. I would not like to set a definite age bracket. Zabala the Olympic winner in 1932 was 20. The world famous Japanese Tanaka, 18, whereas Peters did his best performance at 43. At any rate, I will be inclined to say that a Marathon runner should have passed adolescence and completed his bodily growth, A runner, in order to successfully win a race, should have at least 5 to 6 years of preparation. The maturity of the Marathon runner may come considerably later when the runner has enriched his experience.

In my mind, the relations between the Marathon runner and his coach have to be quite intimate because I think that the Marathon runner needs not only the technical advice of his coach but psychological encouragement and help to build his willpower and mental disposition more than any other athlete. The coach should study the conditions of life and work of his runner so that he may be able to arrange his training schedule accordingly.

It is very hard and perhaps impossible to give a training schedule good for all runners. There are, however, some general requirements which I think should be mentioned. The preparation should try to develop besides the endurance of the runner, his speed and his ability for a steady pace. Endurance might be built up by running on a road or across country 10 to 20 miles, three times a week. Pace running can be developed by running two or three times a week at distances from 4 to 5 miles on the road or track on pre-arranged schedule which does not represent the maximum of the ability of the runner. The pace can be better controlled by the runner if he knows the fractional time of every mile. The distance of 4 or 5 miles has to be repeated after a short period of slow running or walking. This is 3 or 4 times depending on the condition of the runner.

It is advisable that the Marathon runner should use spike shoes in track and work-out with runners of 5 and 10 KM. This should be done at least once a week in order to improve his speed by using the interval system or Fartlek according to preference.

Starting 3 months before the 1st Marathon of the season, the runner must test his ability at least twice a month at distances around 10-20 KM. at a fast pace. It's a good idea, I think, for the Marathon runner to participate in races of cross-country and at 5 and 10 KM. on the track but always as part of his training schedule. The training of a Marathon runner should be planned in the perspective of the whole year regardless of weather conditions, and each year his schedule should be heavier as regards the distances run weekly and the pace kept on his tests.

In order to plan the program of a Marathon runner or any other athlete, we must have in mind the adaptability of the human body. Thus, the longer an athlete has been training, the heavier the schedule he needs in order to improve his performance. The load at the first stage of training depends on the condition and running ability of the athlete.

There is another consideration that the coach has to keep in mind particularly for a beginner Marathon runner, and this is the soreness of shinbone and calf or joints which develops from running on hard ground, usually a road. It is necessary at this instance for the runner to stop running on the road and with spikes and instead to work on grass. In certain cases, in order to avoid soreness, it is advisable to use only rubber soled shoes, until the soreness abates.

For many athletes it has been found, that during the week before the race no running on the road or with spikes is done. It is quite helpful for the runner to visit and study the course that the race will follow since the Marathon courses vary from place to place.

One might ask which is the most suitable hour of the day for the runner to work out. I should think that this depends on the time that the runner is free. Any time can be used for training, granted that general rules of hygiene are observed.

Let's turn now to the race itself. Leather soled shoes with rubber heels and reinforced back part, I think are the most suitable. I like leather soles because in case of wet roads they prevent sliding.

Regarding meals before the race, in order to avoid hunger, the runner can eat two hours before. The meal may consist of broth, steak with boiled vegetables, and canned fruits. After the meal a short walk is advisable to help digestion, as well as in the morning of the race. Half an hour before the race a short warm-up is necessary. The runner should not neglect to check over his race schedule. It is very important and completely up to the runner to try to keep pace according to schedule up to the first 15 to 20 miles. He must never forget that seconds gained on schedule at the beginning of the race might have to be paid for at the end and possibly force him to quit the race. There is always time in the last 6 miles if he feels fresh to change his schedule to a faster pace. He might not win the race but he will improve his record.

In order to prove that steady pace is the most expedient way of running long distances, as far as waste of energy is concerned, I would like to cite an example.

In the Olympic games of London, Gailly the Belgian led the race, but a few hundred meters before the finish line, lost his Olympic gold medal because of not following the proper running schedule. At the first 10 Klms. Gailly was in front of Cabrera by 1'08" and of Richards by 1'17". They almost had the same timing at the 35 Klms. mark. Gailly covered the last 7 Klms. in 29', Cabrera in 28'21.6" and Richards in 28'13.6". That shows that Gailly was running at the beginning at a relatively fast pace, and particularly considering that it was an uphill race, wasted his energy and he paid for it in the last two kilometers.

During the race the brain should be busy with surroundings and not with running only so as to avoid mental fatigue. Relaxation and changing step are techiques that the runner should have developed long before the race.

The question whether or not a Marathon runner should have any refreshments during the race is quite controversial. Most runners do not like to take any refreshments but only when they feel premature exhaustion or hunger they might take some sugar contained in a drink or plain sugar which restores energy. My opinion is that excessive use of refreshments only temporarily refreshes and it is a clear sign of weakening willpower.

After the race, regardless of the results, the runner should try to control his emotions, and recover as soon as possible by slow running or walking. It would be better if the runner does not stop his training for any time after the race.

The training method I have stated is probably not the one used by all Marathon runners, but it is a well-balanced program and in my experience it has been successful.

Kyriakidis, Boston Marathon winner in 1946 in the time of 2 hours 29 minutes and 27 seconds, consistently followed that schedule, as did the Balkan games Champion Ragazos, the 3rd winner of the Boston Marathon in 1947. His best time was 2 hours 30 minutes and 20 seconds.

I had an opportunity to talk with Mr. Mura, the coach of the Olympic Marathon winner of 1948, Cabrera, and I would like you to hear what he told me about Cabrera and his training method.

Cabrera started running back in 1936. It was in the 800 and 1500 m.; his best time in the 1500 was 4 minutes. He did not have any definite schedule of training but as he turned to the Marathon he used to go long distances at á slow pace. However, if we look more carefully at his schedule, we see some sort of system. During December and January which is the warm period in Argentina, Cabrera was running only occasionally but occupied himself with other sports. In the running season he tried to develop relaxation, running with the least possible effort and also he systematically did breathing exercises which consisted of running short and long distances with the least possible respiration. He did not use spiked shoes, but instead ran on the road in rubber shoes. As for the distances he ran, they varied according to the way he was feeling that particular day. Two to four days before the race he never did any training.

His meals consisted of vegetables the last 15 days before the race, and during those days he ate no meat. He took his last meal 3-1/2 hours before the race, and it consisted of vegetables. During the race he used no refreshments. He only used a wet sponge to wet his wrists and neck.

After the race, his weight was reduced by 4 kg. and after 24 hours he could recover entirely. As for the number of races a year, he used to run one or two per year.

Cabrera was also the best 10000 m. runner of his country. He had a record of 31'05". Despite the fact he he ran 10000, he never used to train for speed in relation to the Marathon.

That sort of training, as you might have noticed, was mainly effective in building up his running ability, endurance and determination and it enabled him to win the London Marathon in 1948 at the age of 33. This was a Marathon which, due to the nature of the course, did not permit the runners to use their speed. However, in 1952, when Cabrera had to face in Helsinki a runner such as Zatopek on the rather flat course, his lack of speed came into prominence.

As for his diet before the race, I would say that it had to do with his temperament and personal peculiarity and by no means would I suggest imitation to other runners of such a diet.

Zatopek, the most eminent long distance runner of our time, did not particularly train for the Marathon but his schedule of preparation for 5 and 10 Klms. was so heavy that it enabled him to prepare for the Marathon probably better than others who specialized on this event. We must not forget that he used to run over 30 Klms. a day in addition to the interval distances he covered at varying pace. He also used to compete up to 30 Klms. at which distance he is the world's record holder.

In this discussion, I have been speaking of an athlete who goes in solely for Marathon races. This, however, is not always the case. Sometimes, as in the case of Zatopek, there are athletes that after starting as runners of 5 to 10 Kil. decide to run the Marathon as well. Most of the time it happens that a good Marathon runner can do pretty good time in the 10000 but rarely can 10 Kil. runners do time in the Marathon comparable to their performances at 10 Kil. I would tend to explain that, by saying that the 10 Kil. runner, especially in our day, is geared to fast pace and he hardly has the patience to stay on a schedule which is relatively so slow compared to what he is used to in 10 Kil.

I noticed that Zatopek in 1952 after winning the 10 and 5 Kil. used the remaining days before the Marathon to get used to running on the road at the pace he had figured could permit him to finish and win the race.

To make a comment about the running in Marathon racing, I will say that the form in detail varies from runner to runner but in general I would like to see a form which is characterized by economy of movements and by rhythm. The correct economical style necessary for every running event but particularly for the Marathon is acquired automatically at first after a lot of running and later it can be performed voluntarily. The time needed for the acquisition of such a style varies according to the person involved. It is up to the runner and his coach to reach it as quickly as possible.

As you have already understood, I have not by any means exhausted the subject of Marathon running but it was not my intention to do so, just to point out some general ideas of main importance.

You might wonder, listening to me talking for twenty minutes about the Marathon and still not expressing my opinion whether the Marathon race is an event which is worth doing or whether it is harmful for the runner and should be abolished as many have tried to argue.

I did not do that yet because I feel that the arguments against Marathon running do not have any special validity.

Science and experience with various runners prove that if the runner is healthy, the Marathon race as well as the heavy training do not have any bad effects on his health. Practically all Marathon runners live to an old age and they only suffer from diseases and abnormalities that appear also in persons that never had the hard training, and perhaps to a smaller extent.

I would think that it is perfectly safe to urge people to compete in Marathon running, giving them a good opportunity to prove what potentiality they possess in willpower, determination and endurance.

And as far as that goes, I think my speech presented a test on your determination to listen to me and your endurance to bad English, I may say that you have proved that you have Marathon runners' qualities, and I would like to thank you.

* * * * *

Q. What do you do about preparation of the feet for the Marathon?
A. The problems are the danger of blisters, perhaps from roughening of the leather, picking up a stone, and others. We use vaseline on the inside of the shoes, or perhaps beef grease which is better than lamb. Some runners use socks; some do not.

MARATHON RUNNING IN JAPAN

By Messrs. Oda and Tsuda
Japan

In 1912 at the Stockholm Vth Olympic Games, the Japanese participated in the marathon race for the first time. In those days, marathon running was still in a primitive stage and there was no way of learning the techniques of this race. The only marathon information appeared in the Sports Yearbook.

The Japanese tried hard, but the results were not good and not enough data was available to tell them where they had failed.

We sent teams to the VIIth Olympics at Antwerp and the VIIIth at Paris with hopes for a good showing, but both times all our men finished far behind.

After World War I, amazing progress was made in the sports world. All the countries started to apply new methods of training. Such techniques as the American form in the jumps and sprints and Finnish form in long distance races were developed.

In the field of the marathon, after the Stockholm, Antwerp and Paris Games, Finland gained fame as the "long distance kingdom." Being influenced by this, Japan decided to study the Finnish method. Thus we started to collect data and to study them, trying to find the reasons for our past failures.

Kolehmainen of Finland had won the marathon at the Antwerp Olympics and at the next Games in Paris, Stenroos had won, although his time was not good, due to hot weather. As the former was a noted 5000 and 10,000 meter champion and the latter placed fourth in the 10,000 meter race at the Antwerp Games, we figured that the marathon is not only a race of durability but of speed as well.

In order to prepare for the IXth Games in Amsterdam, we thought that if we took a group of top runners in a 10-mile race, they could be trained for the marathon. Speed was to be emphasized.

So until the year before the next Olympic Games , this picked group practiced mainly the 1500-meter and 5000-meter races and did increase their speed. At Amsterdam, the Japanese led the race until the last five minutes and then began to falter, finishing fourth and sixth. Our runners still lacked experience, but we became confident that victory was near.

For the 1932 Los Angeles games, the Japanese began expecting a win as the Olympic record for the race was broken at a preliminary contest at home. However, this time overwork before the race was held to be the cause of their failure. A pair finished fifth and sixth, but did not show real strength. In this race Zabala of Argentine came to the fore and made it clear that this event was becoming an even speedier one.

But here again another obstacle was noted. This was the painful cramps which tied up the runners around the 20-mile mark. The decrease of speed was quite obvious. The question of how to overcome this by training was the theme of preparations for the Berlin Olympics. Solving this problem was the goal as the team went to training camp.

The method adopted was to run alternately slow and fast, up to the 20 mile mark. (5 miles fast, 2 miles slow, 3 miles fast and 2 miles slow.)

Thus, for a year before the Berlin Olympics to the spring of 1936, our goal was to run the race in two hours, 26 minutes and 42 seconds. We were greatly encouraged when our runners were able to negotiate the distance in 2 hours, 26 minutes on three occasions and 27 minutes another three times.

Finally, in the Berlin Olympic Games, by lowering the Olympic record to below 2 hours 30 minutes for the first time, Japan was able to attain the championship.

In postwar Japan, there were many obstacles in the process of reviving the marathon. For the marathon much energy is required, and in Japan, immediately after the war, there was not enough food for the necessary daily calories. Thus as with most people in the state of undernourishment, it was very difficult to develop runners. Moreover, spiritual unrest resulting from defeat made it almost impossible to

find courage which is of great importance in this race.

However, leaders in local districts formed little groups in their towns and villages and started to train the youth. It was in the spring of 1950 that out of these groups, approximately 10 top runners were selected and put in a training camp.

After a second training camp in the spring of 1951, a Japanese runner was able to get under 2 hours and 30 minutes for a round-trip marathon for the first time.

In April, Tanaka who was then 18 years of age, participated in and won the Boston Marathon. But the next year at Helsinki, the marathon was just a continuation of the long distance races and the Japanese team, again lacking speed, suffered a crushing defeat. Thus, chances of winning the marathon again in the Olympics appeared more remote. Since then, Peters of England and Karvonen of Finland have bettered the world record and Japan was left behind still more.

However, at Boston in 1953 Yamada and the next year Hamamura both won and established world marks and hopes for Japanese marathoners have been revived. But in the marathon, Japan's strength cannot be judged merely by the record, for much depends on the condition of the runners and of the course, whether it is a one-way run or a shuttle course.

At Melbourne, if other runners start at full speed from the beginning of the race as was the case at Helsinki, the Japanese team may again become panicked and abandon their scheduled pace in an effort to keep up.

Therefore, it will be necessary for them to plan to run the first half in one hour and 10 minutes. Because the climate in Melbourne will be warm, the runners must be able to reach the half-way mark in about one hour and 11 minutes to stay up with the leaders.

This is the goal set for the Japanese team. To reach it runners must be able to negotiate the 5000-meters in 14 minutes 30 or 40 seconds, the 10,000-meters in 30 minutes 40 to 50 seconds. We are worried, as no Japanese has yet reached these marks.

Speaking generally, so many speedy runners have entered the marathon field that even Zatopek cannot count on easily winning this race. Probably the one leading at the 32 to 33 kilometer mark (20 miles) will win. Most likely this is also the toughest portion of the race for Zatopek. We expect very serious competition.

For the marathon one needs a combination of both durability and speed. In addition, strong willpower and clear thinking are also necessary. The Japanese team is now striving to do their utmost, but we cannot predict the outcome of this race.

At Marathon's mid-way point in Ruotsinkyla, bellwethers Jansson of Sweden and Zatopek of Czechoslovakia make turn and begin 13-mile homeward leg.

THE MARATHON RACE

By Michael J. Ryan
Santa Clara County Youth Center

The Marathon Race was not on the program of the Ancient Olympics. It was placed on the program of the Modern version of the Olympic Games to commemorate the run of Phidippides, from the Battle field of Marathon to the Market Place in Athens, about 25 miles, bringing news of the Greek victory over the Persians in the battle which, historians say, changed the course of History. On reaching the market place, he shouted, "Victory, Victory," then dropped dead.

The Marathon Race is considered the classic and principal event of the Modern Olympic Games by people of the World, and is witnessed by more people than is any other event. There are more entries from more countries than for any other event on the Olympic program.

The Marathon Race achieved its permanent status in the Modern games, in the true spirit of the Ancient Greek Games, by the victory of Spiridan Loues, a Greek shepherd, in the initial revival of the Games at Athens in 1896. He prayed all the night before the race, in the same spirit as his forbears.

* * *

The Marathon Race is a real test of courage, perseverance, patience, physical condition, mental attitude, and running ability; and the Olympic Games have proven beyond a doubt that peoples of all nations possess these fine and desirable qualities that the Marathon Race so well exemplifies and demands by producing a winner from a different country in almost every successive revival of the Games to date. Winners have come from all five continents, represented by the five intertwining circles on the Olympic Flag.

This race is a modern demonstration of the evolution of civilization, and brings into focus the fact that every human being is a potential track man. Our ancestors had to cover the face of the earth by foot, in quest of food. They had to fight and to flee from enemies on foot. The locomotion of movement provided by trains, ships and planes, as exists today, has resulted from comparatively recent inventions in man's progress, mainly in the last century.

Although condemned by many as being useless and not worthy of a place in our modern sports curriculum, the Marathon Race can still teach many valuable lessons in the athletic, physiological and psychological development of the human race.

In the development of a marathon runner many problems not apparent in other events have to be solved, such as: time to train properly; how to train; coordinating training with necessary occupation; care of feet and proper diet; problems of dehydration, muscle cramps, side stitches; working out a routine running program that includes speed, distance, pace and stride development; study of compensating factors of heat, cold, storms, etc.

A marathon runner who holds a sedentary occupational position, such as a clerk or bookkeeper, who does his work sitting at a desk, has to do far more training than a person with an active occupation, such as a milkman or mail carrier, who is on his feet and using his legs all day.

The clerk could find it profitable to his development as a marathoner to run 5 or 6 days a week, while the person with a more active occupation would derive greater benefit by running three times per week. For the latter, a schedule of running 6 miles on Tuesday, 10 miles Thursday, and 18 to 20 miles on Sunday might be desirable. This schedule could be profitably expanded to include a long walk (2 hours) Wednesday and Friday; while Saturdays and Mondays could be days of rest and relaxation. The Swedish system of "Fartlek" training is excellent for Marathon running.

Intermittent running, the current practice system now in universal use, is an ideal plan, providing enough distance is covered in the daily workouts.

There is no substitute for distance practice in the preparation of a Marathon runner. Many speed

runners have tried to run the Marathon, without doing adequate distance work, to their regret and disappointment.*

The Marathon is really a two part contest: the first and preliminary stage is up to about 18 or 20 miles, which most runners can do; the second stage, a battle for survival of the fittest among those runners who are properly prepared becomes a battle of pace, monotony, dehydration, muscle cramps, oxygen starvation, hunger, desire and determination to finish, requiring a putting out to the limit of human endurance over the final five miles.

The average runner who concentrates on the Marathon and similar long distance races, uses a compensating stride with very little knee lift or arm drive -- a sort of shuffle; short stride with the feet close to the ground and the arms carried with the elbow bent at a right angle. This is a very economical stride, which does not put too much pressure on the heart, preserves the strength, and doesn't cause the legs to cramp as in the high knee lift and high toe action.

To get into proper condition for a marathon, an experienced runner, who is going to concentrate primarily on this race, should take a six months' period in which to train. If he is engaged in a full scale competitive season, in which he runs in other races of varying distances, the time devoted for training specifically for the marathon could be cut to three months.

The start of the training season should be easy, consisting mostly of body building and conditioning exercises, walking moderate distances and jogging moderate distances. The runner should start in the beginning to develop an adequate and satisfying diet which agrees with him, and to get his full quota of eight to ten hours of sleep per night. If possible, he should conform as nearly as possible to the time and conditions of the race for his training, eating and sleeping.

As time progresses he should increase the distance of his training runs, but he should not be trying for speed. Let his improved condition take care of the speed of the pace, without striving for it. The gradual increase in the distance run in training should be continued, until the runner is able to run three or four hours, without too much effort or distress.

When he reaches this stage of his training, he has a good solid foundation of conditioning built and is ready to advance to a more specific stage. He should then begin to develop pace for his race, with the help of a stop watch over distances of five, ten, fifteen and twenty miles. He can help develop pace also by intermittent running of quarter, half mile, etc., at racing pace, either jogging very slowly or taking a short rest between each one.

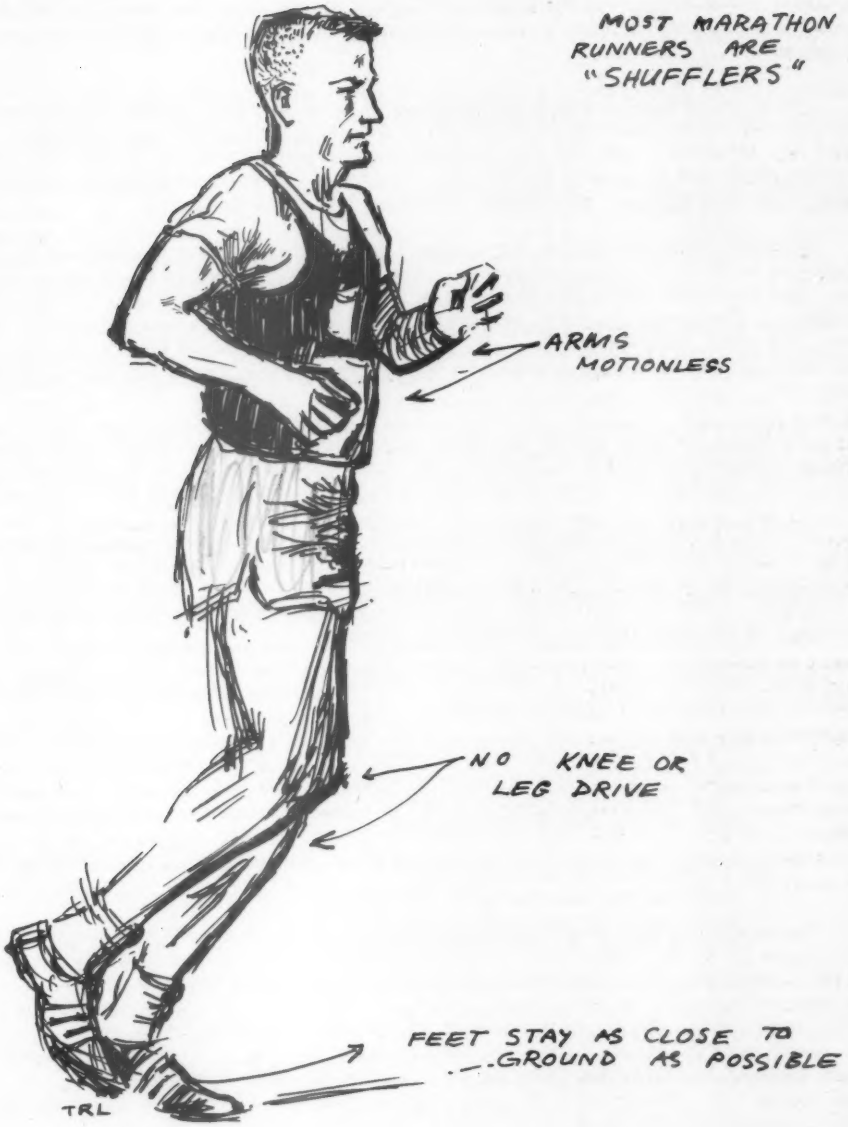
Two months before the race it would be advisable to cover the full distance of the marathon at a respectable speed, but not necessarily trying to establish fast time. Three or four weeks before the race another full distance run over the full course would be advisable under pressure, but not an all-out effort. These two runs should give the runner full confidence that he has the condition and speed to run the entire race under full pressure.

The last few weeks of the training period should be paced work at racing or a trifle better than racing speed at varying distances, not to exceed half the distance of the race. For a full week before the race the runner should do very little training, confining himself to very light jogging and limbering up to keep himself relaxed. He should get an abundance of sleep and rest during this final week.

All during the training period the runner should be caring for his feet, which could be the bane of his existence if not thoroughly toughened to stand the friction. He should soak his feet regularly in a solution of water, sea salt and a few spoonfuls of powdered alum. Walking and running on the beach or in the surf will help toughen the feet.

When running, especially long distances, the feet should be greased with vaseline, lanolin or some other such ointment. A soft shoe, with a substantial sole and heel and no ridges or rough spots on the inside to cause rubbing and raise blisters, should be used, and soft sweat sox, part wool with no seams or ridges, should be worn. Some runners use two pairs of sox while training and racing, one light cotton sox next to the foot and greased on the outside to absorb friction and a heavier pair of all wool or part wool over the lighter ones. If the feet become sore or blistered, running should be discontinued until they are properly treated and cured.

If the weather is excessively hot during the training period, it might be advisable to train very early in the morning before the sun comes up, or late in the evening when the sun has gone down and the


MOST MARATHON RUNNERS ARE "SHUFFLERS"
ARMS MOTIONLESS
NO KNEE OR LEG DRIVE
FEET STAY AS CLOSE TO GROUND AS POSSIBLE
TRL

atmosphere has cooled. To train in the heat of the day might cause excessive dehydration, loss of weight and severe sun burn. It might be necessary to drink more liquid and cut down or modify the training schedule in such extreme weather.

If the day of the race is overly hot, precautions against heat and sun should be taken. Wear a hat or cap, under which a wet cool handerchief or napkin should cover the head, and the body should be protected against sun with a light, loose shirt, long sleeved, and long-legged trunks made out of light loose material, like pajamas.

On an excessively hot day the runner should realize that it might prove disastrous to try for fast time, because he would perspire too freely in the early part of the race, become dehydrated and be forced to give up. He should plan his race to come from behind to win. He should start slowly, avoid the fast and early pace, and be content to pace himself so that he can come to the front, full of running in the latter stages of the race and be fresh enough to hold on until the finish.

Regular eating habits are very necessary in preparing for a marathon race, although I do not believe any special or fancy diets are necessary. The runner should eat as much as he needs of the foods that he likes. However, his meals should be properly spaced and he should take his time eating and chew his food thoroughly. The meals should be balanced as regards to the necessary elements, viz: proteins, carbohydrates, vitamins, minerals, salts, etc. However, the food should be easy to digest and consists of such items as lean meat, eggs, dairy products, garden vegetables, fruits and juices, soups, whole grain bread, butter, etc.

The meal just prior to the race is a very important one and should consist of fruit or juice, meat or eggs, toast and beverage, preferably weak tea. This is not too much, but solid enough to provide fuel for the race. It should be eaten slowly and should be completed three hours before the start of the race.

After this final meal the runner should lie down and rest for a couple of hours, then allow himself an hour to dress and make all other necessary preparations for his great effort. A warming-up process, such as practiced in shorter contests, is not necessary. A very short limbering or loosening up is all that is necessary. After the start of the race, patience, good judgment, race strategy, psychology, courage, determination and good timing will assist the runner.

In conclusion I will leave with you the philosophy of a true sportsman which should exemplify this First International Track Coaches Clinic:

To place the course above renown
To love the game beyond the score,
To honor as you smite him down,
The foe who comes with fearless eyes.

To count the life of battle good
And dear the land that gave you birth
And dearer yet the brotherhood,
That binds the brave of all the earth.

TRENDS IN THE HIGH JUMP
PART I
(STRADDLE STYLES)

By Don Canham
University of Michigan

When the remarkable Mike Sweeney established his world mark of 6 feet 5-5/8" in 1895, using the Eastern style, which was new at that time, the athletic world began to realize the part that form was to play in the further revision of high jumping sights.

George Horine, Harold Osborn, Walter Marty, Corny Johnson, Dave Albritton, Les Steers and Ernie Shelton, to name just a few, further impressed coaches and competitors with the fact that technique must constantly change and improve. They also demonstrated beyond doubt that crossbar clearance could not be standardized or stereotyped into one sure form. Each one of these high jumpers used a form which had similar fundamentals, but in technical phases often varied considerably.

As we all know, in actual practice, jumping form has moved from the Scissors style to the Eastern, then to the Western and Straddle. Today, at our jumping pits, we almost never see anything but the Western and Straddle styles (and their variations) used.

It is evident, however, that the simple division of styles into either Western or Straddle is not entirely adequate. While Walter Davis and Walter Marty both used what we generally regard as the Western Roll, a comparative study of movies of these men side by side quickly shows that they used distinctly different techniques. To say that Gil Cruter and Charles Dumas both jumped Straddle because each man cleared the bar on his stomach, is even farther from the truth. They not only had different points of view, but vastly different fundamentals upon which they based their jumping technique.

For several years, at the University of Michigan, we have believed in and carried this division of styles beyond the straight Western and straight Straddle. In short, we feel there are at least four basic jumping styles; two Western and two Straddles. It has been our feeling that understanding the fundamental variations which Western and Straddle jumpers employ often enables coaches and athletes to capitalize on qualities that certain boys may possess.

To aid us in understanding and teaching, we have, as mentioned, broken the Western Roll down into two basic styles and, in addition, have also found that the Straddle style jumpers actually fall into two clear-cut categories. Movies of most of the world's great jumpers since 1939 have confirmed our opinions, and the present crop of athletes serve as even more pronounced examples.

Following are the divisions, as we see them, with the names of a few of the better known exponents of the particular style:

Orthodox Straddle Style - Dave Albritton, Ohio; Les Steers, Oregon; J. Lewis Hall, Florida; and Charles Dumas, Compton.
Dive Straddle - Gil Cruter, Colorado; Ken Wiesner, Marquette; Ernie Shelton, U. S. C.; and Bengt Nilsson, Sweden.
Orthodox Western Roll - Harold Osborn, Illinois; Corny Johnson, Compton; Dike Eddleman, Illinois; and Arnold Betton, Drake.
Dive Western - Mel Walker, Ohio; Walt Davis, Texas A&M; Milt Mead, Michigan; and Mark Booth, Michigan.

The value of appreciating the fundamental differences in cross bar clearance is clearly shown by hundreds of jumpers, but let us take Walter Davis and Dave Albritton as well-known examples. Walter Davis, for instance, would probably not have been a world record holder had Frank Anderson, his coach, tried to pattern his style after Harold Osborn's back style of Western Roll clearance. With Davis' height and other capabilities, the dive Western Roll was much more practical for him. It was also fortunate that Larry Snyder was quick to see the aptitude that Dave Albritton had for the Straddle, for had Albritton stayed with the Western Roll he might never have set his world mark.

Understanding the variations within the two accepted orthodox styles, Western and Straddle, can be just as important. For J. Lewis Hall to straddle as does Ernie Shelton (with a dive), or for Mark Booth to Western as does Arnold Betton (without a dive), would be just as serious a mistake as having

all shot putters use the style of Parry O'Brien. Different reaction times, body structures, mental approaches and athletic backgrounds dictate different form. Hall, Booth, Shelton and all of the other champions have learned to capitalize on the qualities they do have. I recall a recent NCAA Meet in Lincoln, Nebraska, where the division of styles was very much in evidence. Along with several very fine exponents of the orthodox Western roll, Milt Mead of Michigan stood out in contrast with his diving Western. J. Lewis Hall of Florida and Mark Smith of Wayne, with their orthodox straddle styles, were in direct contrast to Ernie Shelton of Southern California who used the diving straddle. From a satisfactory asphalt take-off on a hot day, one of the greatest high jump contests in college history took place as Mead, Smith and Hall tied for first at 6 feet 8-1/4 inches, with Shelton close behind, in the battle of styles.

As the crossbar moved up and up, it became quite evident why each man used the style he did. Shelton, with his then slow run and lack of power had developed a dive with his straddle to get the most out of his height. Mead, due to his inability to coordinate a strong and straight lead leg, compensated for his low center of gravity with a dive Western. Hall and Smith, two well-coordinated all-around athletes, used rapid approaches, high centers of gravity and remarkably body mechanics over the bar to demonstrate the orthodox straddle style. For the first time in several years, however, standard Western roll jumpers such as Eddleman or Betton were not in the competition at the high heights.

We could not help wondering as we watched this great jumping contest what Mead's potential would be had he been able to use his lead leg as Hall did; or what Shelton's limit would be if he had an approach like Smith's; or who could ever beat Hall and Smith if they could attain their high centers of gravity and still wrap around the bar as Shelton did. No doubt these questions had been asked before, and each man had probably tried and discarded, as not practical for him, what we felt would be refinements in form. Shelton, for instance, might never have had time to get into his beautiful tuck position at the top of his jump with a faster driving approach; Mead, because of his height and lack of great coordination, had found that diving was the type of jump he could employ the best.

In discussing the straddle styles of crossbar clearance, we must first determine the basic phases of the forms. They are: 1) Approach and foot plant. 2) Leg swing and take-off. 3) Body mechanics over the bar.

Now, we will point out the most prevalent technique used by the world's best jumpers for each phase. Theory will be avoided as much as possible and we will try not to be arbitrary.

APPROACH AND FOOT PLANT

While Albritton used more that ten strides to the bar on many occasions, and Shelton in 1953 used only four or five, the average number of strides taken by most good jumpers is six or seven, with the only check mark being at the start of the run. The speed of the run for straddle jumpers also varies from practically a walk up by Dumas to a fast-driving approach by Wiesner and others. Yet, without exception, the last three strides for all jumpers are longer and at an increased speed. In the angle of the approach we notice the same type of variation. Jumpers have had success from 30° to almost an 80° angle, but the average angle of approach is closer to 40° to the bar.

The final phase of the approach is the foot plant, and our motion pictures of at least 50 of the nation's better jumpers of the last fifteen years show remarkable uniformity in this respect. Without exception, the straddle jumper's foot is planted at very close to a right angle to the bar. This is due, no doubt, to the fact that almost never does one see a straddle jumper who is not starting to turn toward the bar before his take-off foot is planted. In order to keep his weight traveling over his toes during the take-off, his foot is also turned off the line of run to the left. In recent years, the planting of the foot at almost a right angle has become a widely accepted coaching practice; however, a wise athlete will continue to concentrate on not turning toward the bar until his take-off foot leaves the ground.

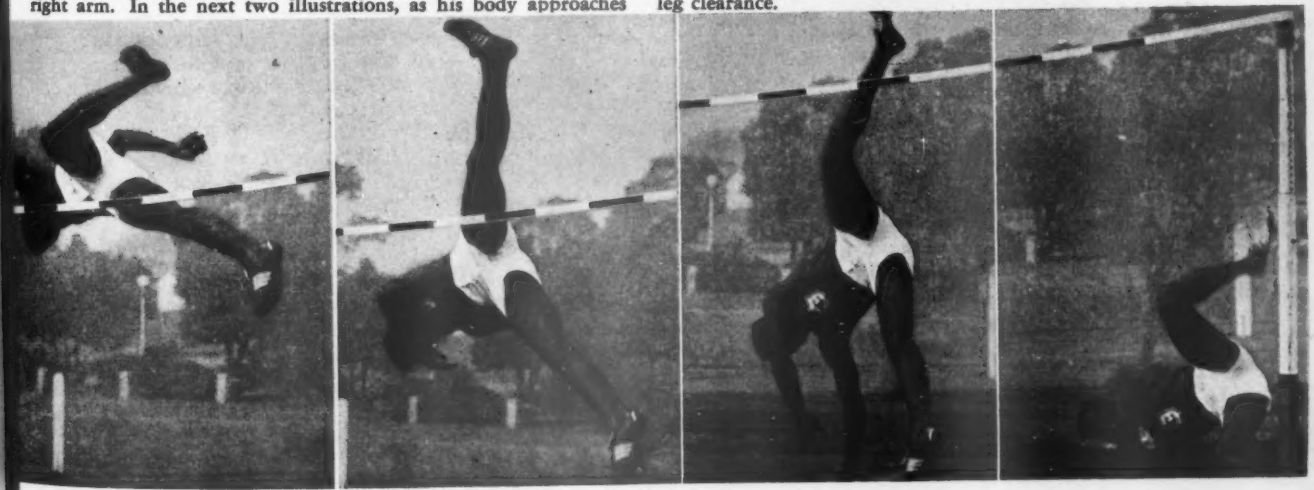
LEG SWING AND TAKE-OFF

Gil Cruter, who jumped 6 feet 8-3/4 inches, Albritton, Nilsson and many others used a bent leg swing of the free leg at all; however, Steers, Wiesner, Shelton, Dumas and others used it as a pendulum. The consensus of opinion on leg swing is that a semi-straight leg kicked away from the line of run (almost parallel to the bar) is most satisfactory. Dumas without doubt has the best leg swing of all time.

In the first four pictures notice the lengthened stride. The first five steps, not shown, are much shorter in comparison. In the fifth illustration attention is directed to the backward lean of the body and the ensuing drive and lift that is developing with the lead leg and upward thrust of the right arm.

CHARLIE DUMAS

The first two pictures below show the continuing motion of tremendous upward lift being generated by Dumas' lead leg and right arm. In the next two illustrations, as his body approaches the bar to a horizontal position, attention is given to lifting and tucking the left arm and snapping the left leg up for hip lift and leg clearance.



However, many athletes who jump the dive straddle have a great deal of difficulty coordinating their body tuck (inverted V position on top of the bar) with a semi-straight leg. Shelton and Wiesner, the most recent of the successful dive jumpers, seem to have no difficulty in using strong semi-straight lead legs.

With very few exceptions, coaches and authors of track books go to extremes in emphasizing that at the take-off, the jumper's body must rise vertically with no leaning toward the bar. After observing literally hundreds of straddle jumpers, we have yet to see one who does not lean both toward the bar and off to the side. In some great dive jumpers like Wiesner and Cruter, and even straight Straddle jumpers like Albritton and Mark Smith, the lean is excessive. The conclusion to be drawn is not that leaning is as asset, but that it may be impossible to convert a perfect vertical take-off (such as Osborn used with his Western roll) into a stomach lay-out necessary for straddle jumping. Leaning may be necessary.

The factor which seems constant in all great jumpers is that the weight usually passes over the take-off foot even though the jumper's head and shoulders may be leaning in anticipation of lay-out. Then the actual center of gravity is over the take-off foot, despite the fact that the trunk is not erect. In short, it is not necessary to have an erect body to keep the center of gravity over the take-off foot. Albritton, Wiesner, Hall and others too numerous to mention, while leaning to get position for lay-out, manage to bring their center of gravity up over the take-off foot in time to get fine upward drive from the take-off leg. The conclusion then on straddle body lean at the take-off seems to be that the center of gravity remaining over the take-off foot is the key to an efficient take-off. Erect body position with no lean or turn is probably impossible for straddle jumpers, but keeping the weight over the foot, even with a corkscrew take-off such as Hall uses, is not only possible, but essential.

While the orthodox straddle jumper attempts to drive his chest as high from the ground as possible, the dive straddle jumper concentrates on getting his head and chest down on the other side of the bar as quickly as possible. For this reason, we find dive Straddle jumpers leaning in more at take-off and thus getting less apparent power from the take-off leg. Exponents of this style are willing to sacrifice some original lift for what they feel is vastly more economical position when the bar is cleared.

BODY MECHANICS OVER THE BAR

We have seen that the two Straddle styles are the most efficient. Heretofore they have been limited mainly by the inability of any athlete to incorporate the power of the vertical take-off (often possible in the Western roll) with the efficiency of clearance the form provides. In spite of take-off complications, the straddle styles still seem to hold their own in popularity.

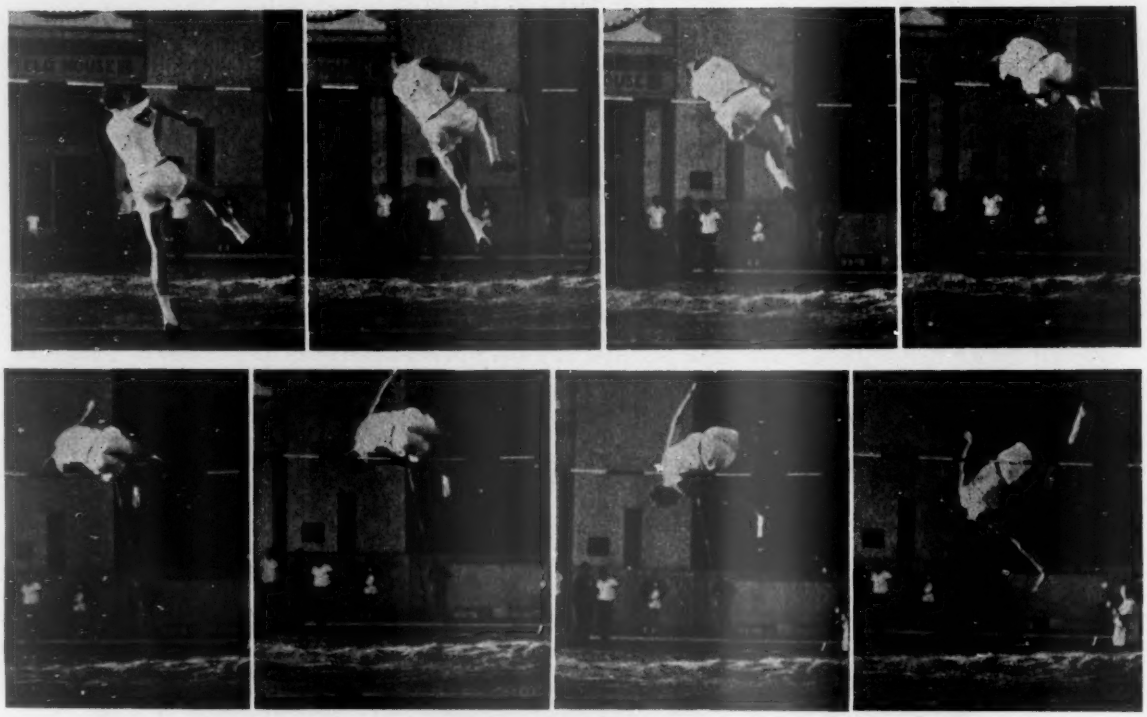
In the orthodox straddle the jumper drives his head, shoulders and chest well above the bar, and then while dropping the right side of his body toward the pit he rotates his head and hips to assist in clearing the bar with the left side of his body. Lifting of the entire left leg or frog kicking it while turning the toes up, turning the head back to the direction of run, and simultaneously rotating the hips help second leg clearance.

The dive Straddle as employed by Cruter, Wiesner and Shelton differs from the straight straddle in two ways. The jumper's head and shoulders lead the jump from take-off to landing. They are not driven so high - in fact, usually just high enough to clear the bar. As soon as they have cleared the bar they start down, arching the back and putting the jumper into an inverted V at the height of the jump. The basic difference in the styles is most evident just over the bar where a dive straddle jumper is in a semi-jackknife position (which allows a lower center of gravity) at the top of his jump. The second leg clearance is usually accomplished by a lifting action rather than by hip and foot rotation, because the early dropping of the jumper's head and shoulders greatly assists second leg lift clearance.

The conclusion which might be reached concerning the two styles, when studying pictures, is that the dive straddle is the most practical, particularly since Wiesner and Shelton, two of the best jumpers in the world, use it. It must be pointed out, however, that while these two men with their remarkable timing and ability to control their hip tuck at just the right time look trememdously efficient, this does not mean that even well-coordinated orthodox straddle jumpers like J. Lewis Hall and Charles Dumas are suited to the style. Only after much experimentation may a boy and his coach determine which style is the one for the athlete to use. After all, three of our all-time greats, Albritton, Steers and Dumas, jumped the straddle without a dive.

One thing is quite evident, however, to those of us who have watched Bengt Nilsson in Europe and Ernie Shelton here, and that is that these two men have (knowingly or not) incorporated the good features of the old barrel roll as used by Gil Cruter with the standard advantages of the straddle, as used by men like Steers, into a style which now must be considered an accepted and efficient form of crossbar clearance---THE "DIVE" STRADDLE.

BENGT NILSSON



MILTON MEAD

Illustration 1 shows Mead at the end of his seven-step approach. His take-off foot has been planted off the line of run to compensate for early leaning which is so common with dive jumpers.

In Illustration 2 the kick of Mead's free leg has started. His inability to incorporate a kick along (rather than at the center) of the bar causes faulty leaning to the left at the take-off.

Notice Mead's head leading the jump, and also the little use he is getting from his now bent lead leg. Hunching of the inside (left) shoulder has helped to bring his center of gravity up over his take-off foot (Illustration 3).

Illustration 4 shows Mead's head and shoulders as high as they will go. They will not start down before his hips have cleared the bar. His lead leg should be semi-straight and kicked along the bar.

In Illustration 5 the dive has started. Mead's head is going down, while his hips are still rising. Notice the now completed pull-up of his left leg before his hips are over the bar.

Illustration 6 shows the top of the jump. Mead is wrapped around the bar with his head down on the far side even though his hips are still not as high as they will go.

Evidence of the dive is shown in Illustration 7 as Mead's head and left shoulder are well below the bar on the far side and his hips are still not above the bar.

Illustration 8 shows the way in which the farther drop of Mead's head and his shoulders have flipped his hips up and clear of the bar. The dive has let him take advantage of a lower center of gravity than he would need with the orthodox Western roll.

The early drop of his head and shoulders has put Mead into this extreme dive position and he is started toward the pit almost head first (Illustration 9).

Illustration 10 shows Mead landing hands first to break the fall from his dive. The crossbar is set at 6 feet, 8 1/4 inches.

TRENDS IN THE HIGH JUMP
PART II
(WESTERN STYLES)

By Don Canham
University of Michigan

Some twenty years ago, high jumpers, regardless of the style they used, were disqualified if their heads preceded their feet over the bar. When this dive rule was removed from the rule books, the Western roll style of bar clearance, at least, underwent changes. Jumpers no longer had to be concerned about their heads crossing the bar before the rest of their bodies and, as a result, many jumpers changed from the Harold Osborn back style of clearance to the less complicated, and possibly less efficient, side clearance. The first trends toward the latest alterations in Western form became evident about this time.

Today, we are witnessing a drastic alteration in Western roll clearance which is so successful that an entirely new style has developed, as we saw in the case of the Straddle style.

The remarkable jumping of Albritton, Ed Burke, Cruter, Steers, Wiesner, Hall, Shelton, Bengt Nilsson (Sweden) and Dumas all of whom jumped over 6 feet, 9 inches, while employing one of the straddle styles, has tended to obscure the progress and development of the Western roll.

Probably due to the relative newness of the Straddle, or possibly because most coaches realized that the 1st high jumper to go over 7 feet would straddle, most of the technical articles in recent years have dealt with the Straddle style of jumping. Investigation, however, might surprise us when we look at the history of the last fifteen years in the high jump. For instance, during the period from Albritton to Dumas, when the Straddle styles became our most widely used forms of jumping, Western roll jumpers were also writing a spectacular history. In fact, in 1936 when Dave Albritton set his world mark of 6 feet, 9-3/4 inches with the orthodox straddle, the late Corny Johnson, who was Olympic champion that year, duplicated the feat with the Western roll in the same meet. In addition, Mel Walker (6 feet 10-1/4 inches), Johnny Wilson (6 feet, 9-3/8 inches), Bill Stewart (6 feet 10-3/8 inches) and Walter Davis (6 feet 11-$\frac{1}{2}$ inches), jumping Western, matched our best straddle men inch for inch, and often surpassed them.

Going back to the turn of the century, we find eight Western roll jumpers who held world marks, and only three record holders were straddle jumpers. This fact appears to be more interesting than significant. Yet, since Albritton set his world straddle mark in 1936, Walker, Steers, Stewart, Davis, Dumas , Nilsson and Shelton, have jumped 6 feet, 10 inches or better outdoors; of these about half used the Straddle and half the Western. The only thing these facts tend to prove is that while many of us feel the greatest potential lies with the Straddle styles, we must not overlook the facts concerning the Western roll, and its potential for certain boys.

If there has been criticism of the Western roll style by students of high jumping, it is simply that the orthodox Western requires a man to have a higher center of gravity to clear a given height than would be necessary using a Straddle style.

The problem is not quite that simple, however. With the less efficient crossbar clearance of the Western roll, we usually find more powerful and effective take-offs. Conversely, with the efficient crossbar clearance of the Straddle styles, we invariably find a multitude of take-off problems. The real question, then, is: does the Western roll take-off compensate for the form deficiency, and does Straddling the bar give a man a real advantage even though his take-off cannot be 100 per cent sound? Albritton, Steers and Dumas cast the vote with the straddle, while Johnson, Walker and Davis make the Western clearance look appealing.

One of the most significant developments in Western roll high jumping has been the departure from the long established style of rolling over the bar, from a fine side or back layout position, to a jump where the athlete attempts to wrap around the bar for more efficient clearance. Today, therefore, we see the same trend in Western roll jumping that we have found in Straddle jumping. The style has simply broken into two distinct forms, with the technique, objective, and mental approach being quite different. On the one hand, we have the orthodox Western roll with its horizontal layout and three-point landing on the jumper's hands and take-off foot. On the other hand, we have the dive Western roll where

the jumper's head leads the jump from take-off to landing. While many of our best jumpers continue to use the orthodox Western such as Eddleman who was a member of the 1948 Olympic team and Betton who was on the 1952 Olympic team, it is significant that many of our national champions like Walker, Mead, and Davis have employed the dive Western.

It seems much more practical for the high school and beginning college jumper to learn the orthodox Western roll first. The sound take-off and relatively simple features of the style usually provide the average jumper with a basic form which enables him to be consistent and reasonably efficient. The fact that recent advanced jumpers like Walter Davis, Mark Booth and others have consciously incorporated an extreme dive into their Western roll; however, makes it necessary to investigate the diving Western roll.

THE RUN

Between Bill Stewart, who ran at the bar like a sprinter and covered 14 feet from take-off to landing, and Mel Walker, who sauntered up, there are a host of jumpers like Walt Davis who use moderate speed and acceleration in the run. The angle of approach and length of the run also varies considerably in Western roll jumpers. Many men have found that a sharp angle of approach allows them to take off closer to the bar, but by the same token, the hazard of the jump is often increased as they travel along the bar longer during clearance. The most popular, and in most cases practical, Western roll angle is about 40 or 45° to the bar. The length of run most widely used is six or seven strides to the bar, with the last three strides slightly faster and thus longer. Only one check mark is necessary, and that is at the start of the run. More than one check mark often distracts the jumper during his run up, and will force him to put his head down rather than up where it should be just before take-off.

FOOT PLANT

For years Western roll jumpers have been taught to plant their feet in line with their run. That sound advice still holds true for men who jump the orthodox Western roll as used by Osborn, Marty, Betton and others. Yet, Davis and Booth, two dive jumpers, plant the take-off foot off the line of the run toward the bar, a plant similar to the straddle jumper's. This plant of the take-off foot, of course, is compensating action for the lean into the bar that dive jumpers show at the take-off as they lead their bodies with their hands first. By turning the take-off foot slightly to the left, they insure their body weight traveling over their toes as they turn in and forward at the take-off in anticipation of the dive which is the basis of their keeping a low center of gravity.

KICK

The semi-straight kick of the lead leg is the most widely used. However, Mel Walker had wonderful success with the very straight lead leg, and others like Mead have become champions through the use of an extremely bent lead leg. The pendulum action of a semi-straight leg simply offers more upward thrust when it is properly used than does a bent knee. A kick similar to that used by Dumas is ideal.

As in straddle jumping, the best kick is usually along rather than over the center of the bar. This type of kick allows the jumper to work closer to the bar, and offers the possibility of a more vertical jump. Also, it tends to pull the jumper up over his take-off foot.

TAKE-OFF

One of the strongest features of the orthodox Western roll is the vertical take-off with the center of gravity moving directly up over the take-off foot. While this take-off is difficult in the straddle styles, because the jumpers turn early for position, it is comparatively simple in a Western roll where the jumper is not trying to lead the jump with his head. When a jumper is diving, his take-off problems become the same as those of the straddle jumpers.

The basic reason that orthodox Western roll jumpers most often display a vertical, and thus the most efficient and powerful take-off, is that by clearing the bar on their sides it is anatomically possible for them to jump up first before making the quarter turn to the layout position. Straddle jumpers, as mentioned previously, face another problem, since it is just not anatomically possible for them to use the powerful vertical take-off of the Western roll, and then make a half turn over onto their stomachs. Thus, the orthodox Western roll exponents have been quite successful because they can, and do, employ the most powerful, efficient take-offs yet devised.

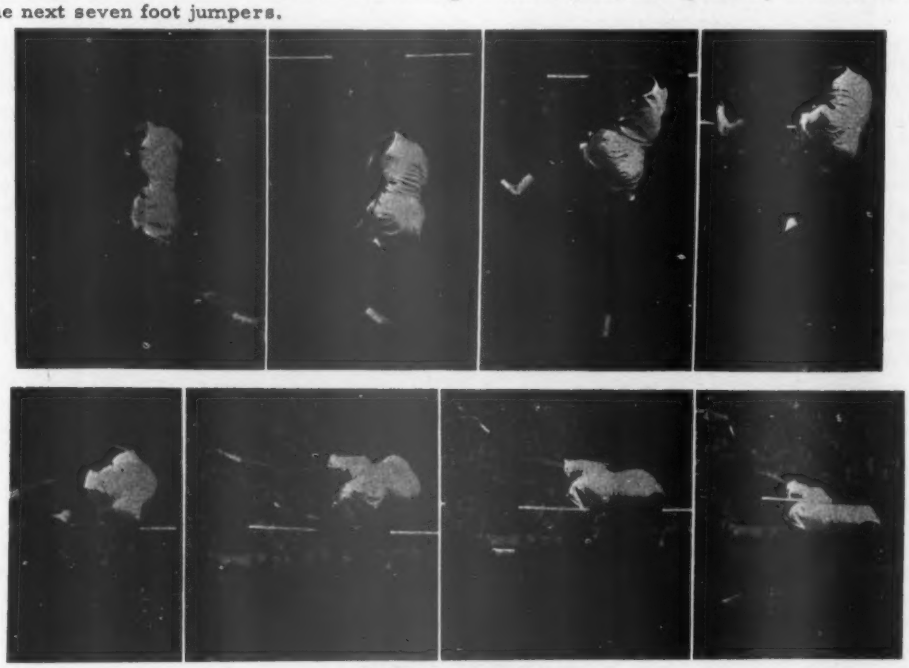
A slightly different picture, however, is presented by dive Western roll jumpers. Since the theory behind the jump is keeping a low center of gravity, the jumper's head and shoulders are not driven as high as possible, because they must drop on the far side of the bar before his hips have reached their maximum height. For this reason, the jumper leads the jump almost head first, and while the center of gravity may be over the foot, a vertical take-off is not accomplished and some loss of power is the result. Dive jumpers, however, feel that the power loss is more than compensated for by the wrapping around the bar that leaning in and diving enables them to do.

The orthodox Western roll jumper usually works closer to the bar at take-off than does the dive jumper, thanks to his take-off efficiency. Most sound orthodox Western jumpers take off about 36 inches from the bar, while dive jumpers, almost without exception, due to their premature layouts, take off four feet or more from the bar.

BAR CLEARANCE

Harold Osborn, and a very few others were so efficient at controlling their jumps that they could clear the bar almost on their backs. The great majority of orthodox jumpers, however, if they ran from the left, would clear the bar on their left sides with their left hips being constantly the low point, thus the limiting factor in the form on top of the bar. Dive Western roll jumpers, by starting their heads and shoulders down early, have pitched their low hips up so quickly that the clearance problem with them is no longer their hips. Walter Davis, for instance, almost never displaces the bar with his hip. He is much more apt to displace the bar with his inside knee or his chest as he turns too quickly. His hip is usually his highest point of clearance.

In conclusion, it should be mentioned that many successful dive jumpers are tall like Walker, Mead and Davis. Their body mechanics are thus usually less efficient than those of the boy of average height, and the form they have used may have been born of necessity. Yet, several small men like Mark Booth of Michigan have used and are now employing the Western roll with a dive. It is not a perfect form by any means; yet it has features that are interesting to contemplate, and possibly it will be the form used by the next seven foot jumpers.



ARNOLD BETTON

In Illustration 1 Arnold Betton is demonstrating the Western roll without a dive. He is able to drop lower than most jumpers, a fact which partially explains his tremendous lift.

THE FORM AND TRAINING OF WALTER DAVIS IN THE HIGH JUMP

By Col. Frank Anderson
Texas A. and M. College

From a polio cripple to world champion high jumper is the story of Walter Davis. Walter is 6 ft. 8 inches in height and like most tall boys was not too well coordinated. He had to work long and hard to be able to use his long limbs in the desired manner. He came to college as a basketball player, primarily, but had high jumped 6 ft. 2 inches while in high school, using the scissors style of jumping. Walter at first tried to use the straddle style of high jumping, but was finally convinced that he could not use that style and changed to the easier western style. His freshman year at Texas A. & M. was taken up with basketball and with spring basketball practice. He got in very little jumping that year. In his sophomore year we got him out of spring practice for basketball and he spent a confused season when he tried to convert to one of the approved styles of high jumping. He did not place in the Conference meet that year. He was late again in reporting for track during his junior year, as he was a member of the basketball team and that season closed about the first of March. At this time he was jumping in a style about half way between the straddle and the western, but was giving his thought and effort toward learning the western method of jumping. After our fourth meet that year I had the opportunity to go to Germany to conduct a track and field clinic for our armed forces and was away for three weeks. During this time Davis developed a unique style where he took off 6 feet plus away from the cross bar, with both feet leading and broad jumped over the bar at a sufficient height to win the Texas Relays high jump against a number of good jumpers. Upon my return from Germany, I felt that I had better let him alone for the remainder of the season. He went on to win the NCAA using that 90 degree angle approach, semi-broad-jump style.

Walter took some summer school work at the College that following summer and lived on the campus. We got in some work, in this out of season, non-competitive period, and he learned the western style of high jumping. He worked at heights which he could clear with little effort and with much thought and practice, coupled with patience and desire, he emerged with just about the finest and most economical western style we have seen.

Davis uses the diving type of western high jump form. We believe the diving type of jump is better for most men, whether they are advocates of the straddle or of the western style of jumping, since in that manner the entire body is not over the bar at any time, permitting a lower center of gravity while making the clearance. His head and shoulders, arms and leading foreleg are well over the bar and going downward before the hip clears. Walter's take off of 4 ft. 8 inches away from the bar was, in my opinion, too far away from the bar, even for his height. He used a seven step approach and came in at an angle of 45 degrees, with a fairly fast approach. During the last three strides, which were lengthened, the upright body was settled into a slight crouch. The eyes were kept on the bar and no check marks used except the starting point. He was above the take off foot as it left the ground and though he dived, I am sure he completed the spring before the dive began. His lead leg was swung upward with a bent knee action, but the lead leg straightened at the completion of the take off, so that the lead foot crossed the bar at the same time his head cleared. The hip at this time was well back and down on his better jumps. In this respect, I mean jumps in which his form or timing was better, not necessarily his winning meet jumps. Davis was often in a descending motion and his turn a bit too far advanced at the time his body passed over the crossbar. He displaced the bar on many of his jumps when a take off a few inches closer would have given him a clearance. I think this is evident in the sketch shown herewith of his world record clearance, which was made in the NAAU at Dayton.

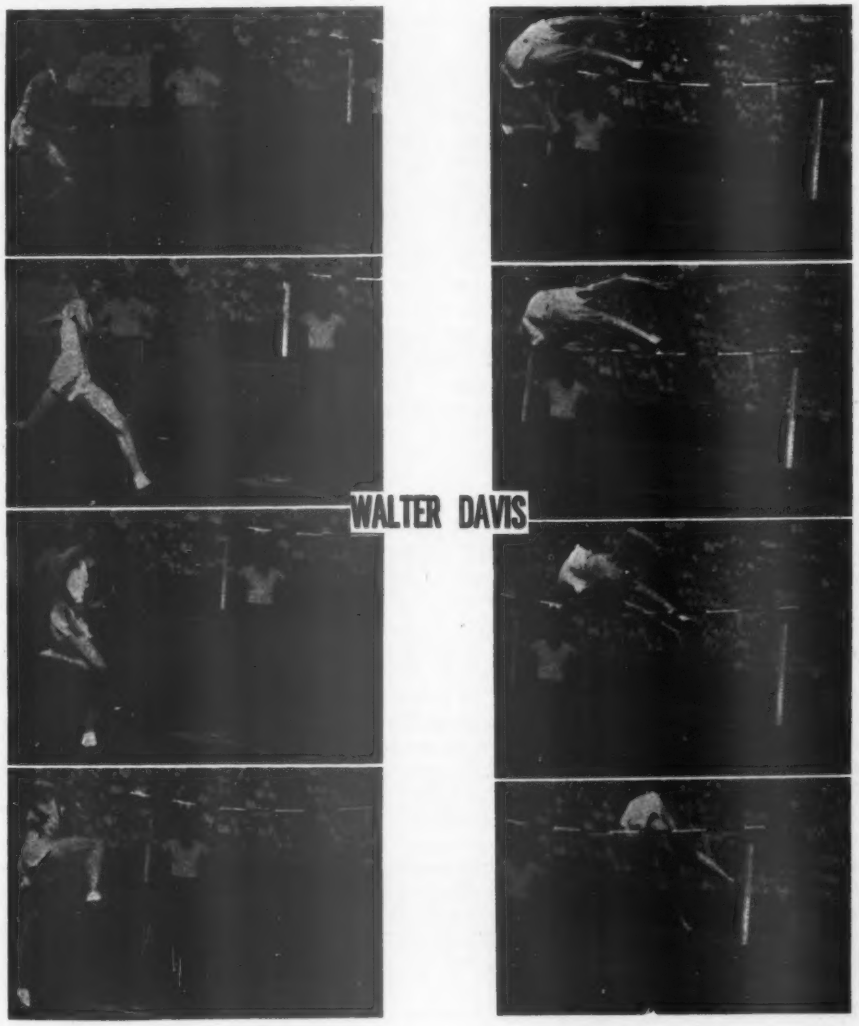
Photo number one show Davis in an excellent western style jump. This jump was made at night. On two other ocassions he cleared seven feet at Texas League parks in night exhibition jumps as an added attraction at baseball games. I have an idea that Davis found it easier to take off closer to the bar in his night jumping. These jumps were made a year after he set his record and without a doubt he had improved over his college jumping days. I always felt that he could have traded a foot or so more of his broad jump distance for a couple of inches more of high jump. In the series Davis has his best height while directly above the bar.

Photo number two is a true picture of his world's record clearance and is a superb example of economical form. Even in this jump his best height was probably four or six inches back. The turn is a bit too far advanced, with an advanced hip raise. These pictures clearly show that Davis curls his body over the cross bar and that he does not carry any part of his body too high. All jumpers are aware that no part of the body may be carried low and have a successful clearance. Davis worked to keep all parts of

his body DOWN to the bar, as well, in making the crossing. Most of our top high jumpers are guilty of a high hip at the time of the clearance. This is more true in the case of the straddle jumper than with the western style jumper. The boy who will break Davis's record, will probably be a jumper who can handle the hip, as well as be a great jumper who is able to handle the other elements of the high jump.

Photo number three shows the diving completion of his record jump. Davis clears the bar with his right foot in the lead, but from that point the dive takes over and he comes down on his hands.

The training methods used by Davis during his junior and senior years were easy workouts on the grass and a dozen or so jumps at challenging heights the first three days of the week. The hard, driving work in basketballl gave him the necessary basic donditioning. He did no work two days before a meet and took very little warm up before the meet started and none between jumps. He would lie down between jumps, apart from others, with his mind and body given over to concentration and relaxation.



THE POLE VAULT

By: Cornelius Warmerdam
Fresno State College

It is a great honor to be a part of such an outstanding event as this International Track Clinic. In turn, I hope that my talk will prove of some value to you.

Let me begin by saying that I have no secrets to divulge nor do I know of any short cuts towards developing 15-foot vaulters. If I knew of such, my own men would be making routine 15-foot jumps.

The problem briefly in vaulting is how to get yourself off the ground and over the bar with the aid of a 16-foot pole. One of the first things a youngster will ask is how high he should grip on the pole. Any one of you who has ever picked up a pole knows that if the pole is gripped too high it is difficult to leave the ground and that too low a grip causes a swing-through with no time to do anything. Now there are many factors influencing the handgrip on the pole. Speed is one of the most important. In general, all other things being equal, the faster you can run, the higher you can grip the pole. This is a direct ratio which will always prevail unless the vaulter does something wrong elsewhere to hamper his effort. Strength is another important factor because it takes a lot of power to transform horizontal movement into upward movement at the take-off. Beginning vaulters, of course, in many cases, lack this strength and this explains why they cannot do what you want them to do in your coaching. This holds true not only for the pole grip but also on the swing, pull-up, etc. A boy who cannot do a pull-up on a horizontal bar could hardly be expected to get himself into a good handstand on the pole. This strength must be acquired in the off-season months in the gym on the bars and ropes. Coordination is also a strong factor on the grip since a good sense of timing can help ease the shock of the pole hitting the box. A vaulter's height affects the grip to a great extent. The tall boy has a definite advantage here since he can grip the pole higher than his shorter competitor with the same amount of speed and strength. This is a definite mechanical advantage because the higher the grip, the higher a vaulter should be able to jump. The method of planting the pole also has a part to play. We have seen in the past men running on the approach at a speed of 9.6-9.7 yet losing all this tremendous speed advantage because they were unable to get the pole into the box smoothly without a jerk. Prevailing vaulting conditions could cause a difference of 6 inches on your grip. A soft runway and wind into the runner are two examples of disadvantageous vaulting conditions.

To sum up this handhold problem, then, we can see where a rank amateur might have to grip the pole 3-feet above the bar whereas the experienced man could grip it 2-3 feet below the bar. As technique and strength improve, the beginner brings his grip closer to the bar until he has the experience to hold below it. My best personal grip was 13 feet 11 inches from the butt of the pole. This is relatively high although the big modern vaulters may soon exceed it with their height, speed and improved poles.

Now I would like to talk about the plant. Your general objective here is to transform the velocity you have developed on the runway smoothly upward. It should start at least two strides from the box. The pole is pushed forward with the right hand as close to the hip as possible, thus the pole is sliding through the left hand as it moves up the pole to meet the right. The idea is to do these movements deliberately, avoiding any jerks. Arms should be over the head with the elbows flexed to help take the shock which must be absorbed. The eyes should be watching the box until the pole hits, then up at the bar. Timing is very important since the pole should hit the box slightly before the take-off foot hits. One way of putting it is to get the pole in early and run under it.

I'd like to stop here and get a general picture of the technique after leaving the ground. You must remember the pole is your friend; stay with it, close to it, and let it carry you upward. As you pull, curl around it, ride it upward and don't try to leave it until it is ready to give you support as you push. The moment you get too far away from the pole at any stage of the vault, you are going to lose valuable leverage which cannot be regained on that particular vault.

Now let's go back to the swing which is the next movement following the plant. What is swing and what are we trying to accomplish as we swing? Swing is a delay or hang to improve the catapult action of the pole and body. Without it, full utilization of the run velocity cannot be attained. It is the instrument if we can visualize it that way, to help change horizontal motion into vertical motion. We are trying to make a round corner out of a right angle. In other words, why try to pull the body upward immediately at the take-off? far better to hang and let the body go forward gradually until checked smoothly by the grip on the pole. Then the legs are brought up with a sweep which, if done properly, seems to shoot the vaulter

upward from the pole upon completion of the vault. This swing should be straight ahead with no turn whatsoever. It must, of course, be under control as there is such a thing as swinging too far and not being able to get the body up at all. Swing only takes a second but pays big dividends. Telling a vaulter to arch his back or to let his stomach and hips out seems to give him the idea of swing. Swing can be readily developed but must be worked on steadily and conscientiously.

The pull and turn come next. Pull generally starts when the knees are shoulder high. Turn starts almost at the same time and consists merely of crossing the right leg over to the left and over the left. This action is aided by the natural rotation of the body as the pull begins. A very important item here is what we term the "roll back on the pole." This means bringing the knees back as close to the pole as possible even to the extent of touching it. The roll back does two things. It keeps the legs up longer so that as the push starts they will be up above the bar and not reaching out to the bar. It also keeps the body close to the pole where the leverage is more effective. Good 14'8" vaulters make the common mistake in attempts at 15 feet of not staying in their tuck long enough. They rush completion of the vault before their pole and body positions are in the proper spot. If this roll back is done properly, the pushoff drives the body upward and over the bar instead of outward and toward the bar.

Many good vaulters don't seem to know where the bar is when they are pushingoff and consequently miss vaults which should be easy for them. A good exercise for this defect is to have the boy do a handstand on a bale of hay or similar object, then hold a crossbar under his hips and let him push off. He can get lots of practice this way without going through the actual vault.

Releasing the pole causes trouble at times since there is nothing so discouraging as making a clean vault only to have the hands or elbows pick off the bar. Those troublesome items can be controlled by telling the boy to turn his thumbs inward, thus causing the elbows to go out away from the bar. This action also keeps the chest in better. One of the worst releases is throwing the arms up over the head. This movement causes the chest to come out and make contact with the bar on close vaults.

In conclusion, I know I haven't touched upon all aspects of the vault but our limited time makes this impossible. I have tried to pick out the more troublesome items and hope they will help some of you solve your problems while coaching this event. I certainly want to thank Mr. Winter for having me on this program. To all of you, thank you for your very kind attention.

* *

(Question) What hand hold would you recommend for a man 6'4" tall? (Answer) He should be able to hold at least 13 feet. If he is fairly fast he should hold even higher.

(Question) Is there any time during the vault that a man should look at the bar? (Answer) As soon as the pole is planted in the box. (Question) Not from above? (Answer) No.

(Question) How about clearing the elbows? (Answer) Many men ruin a good vault by dragging their arms. When they finish pushing and are about to release, they should turn their thumbs inward. This will throw the elbows out and keep the chest in.

(Question) Do you have any remedy for a crossover too far to the right? (Answer) No, I don't. I think it comes from some fault in the plant. I can't give you a remedy. (Suggestion from Nytro) Put the pole in a little more to the right. The fault may come from carrying too far to the left. (Suggestion from Doherty) Draw a white line down the runway and carry the pole down the line, with the body to the left.

(Question) What is the best material for a pole? (Answer) Bamboo is still pretty good for high school kids. Now most everybody uses either Swedish steel or the Gill pole. The Swedish is good for kids because of the small grip. It is made of an alloy of three metals. The Gill pole is probably the most popular in college. It resembles the bamboo in its action. The English have a pole similar to the Swedish but it isn't quite as good; it is more like the old aluminum - it isn't elastic enough, it doesn't lift.

(Question) How about training? (Answer) Run a lot of 220's. Run over low hurdles to get uniform stride length. Four or five hurdles with seven steps makes a good workout. Practice technique in the fall. Work on the horizontal and parallel bars. Work on the low bars for balance and do a lot of walking on the hands. Weight lifting of certain types is beneficial; Richards uses it. Do short dashes, 50,40 or 20 yards, repeated. On the bars, do pull-ups, kips, anything with swing. Jump at the horizontal bar and hang on. Work on ropes, pulling straight up for shoulder development. These things should be done in the fall and winter. You must have a good background and background is built in the fall.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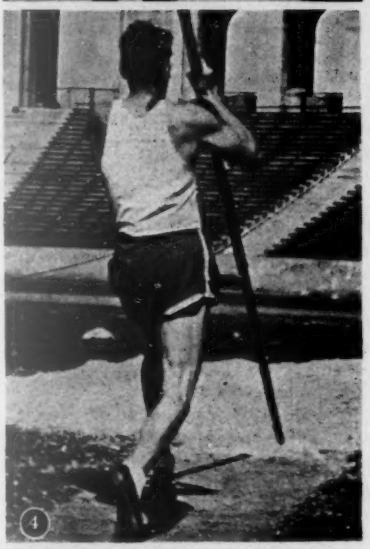
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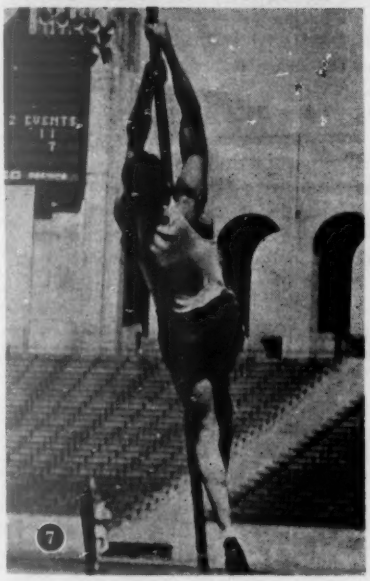
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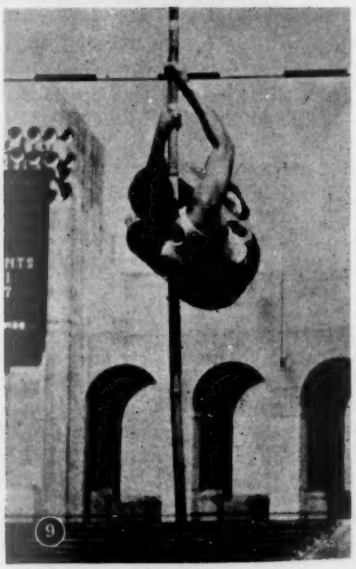
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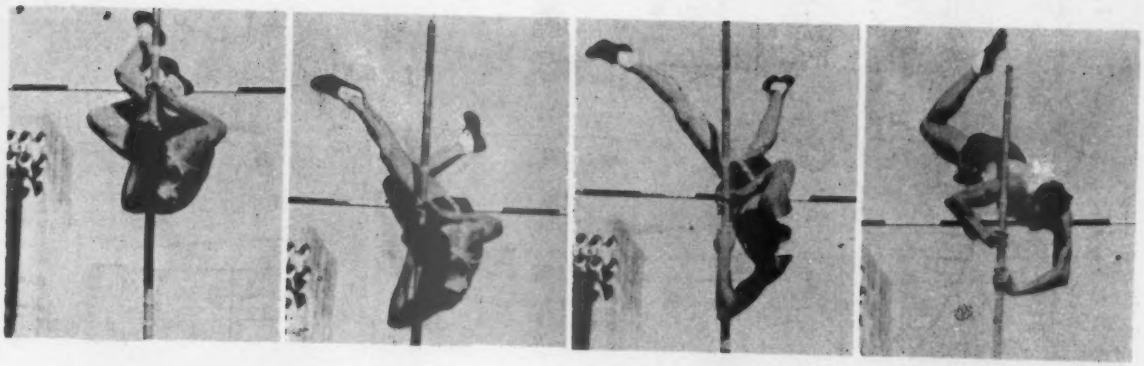
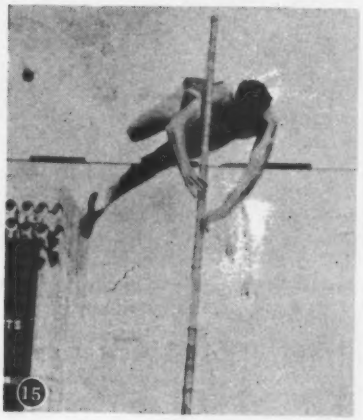
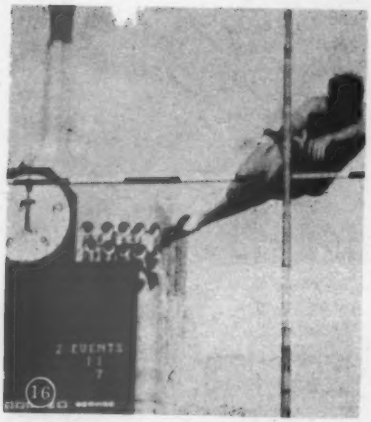
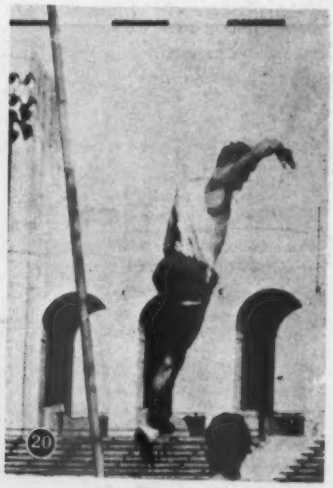








CORNELIUS WARMERDAM

SOME PERTINENT QUESTIONS ON THE POLE VAULT

By Ray F. Kring
El Dorado County High School
Placerville, California

Let me start out by saying that this is just one coach's humble view of a very complex exacting sport. The points brought out here are by no means the final answer to all the problems that exist in coaching pole vaulters. Success in this event, like all other events in Track and Field, depends a great deal on plain hard work, and no amount of expert coaching is going to make a 13 foot pole vaulter out of a boy who doesn't want to spend the extra time on it. If however you find a boy with average athletic ability, and a burning desire to excel, and if you can keep this flame kindled while leading him up the right path, then you can be a success as a coach.

Perhaps one of the reasons that the pole vault is so difficult to coach is because of the great amount of different movements involved from the moment a boy picks up a pole until his landing in the pit. The speed at which most of these movements are executed is another factor to consider. The average time consumed from take-off to bar clearance is no more than 1.02 seconds.

This is meant by no means to be a dissertation on how to pole vault, instead I have tried to answer some of the questions that have been asked me about the event over the past years. Some of my answers, as radical as they might be, may be of some aid to you in coaching this event. I hope so anyway.

Q. - How do you find pole vaulters?

A. - I don't find pole vaulters, I let them find me. The old saying, "Champions are made and not born", certainly applies to the pole vault. To become a good vaulter a boy has got to do a lot of pole vaulting. The time allotted for practice is not enough, it's the "extra" time that a boy is willing to put in that makes the difference. I have never yet looked at a boy in a gym class and said, "You ought to be a vaulter". Maybe I'm missing the boat on this, I don't know. But give me the boy who just plain likes to pole vault, one who has the "stick-to-itiveness" to take the slow progress that comes with learning an event like the pole vault, and likely as not we'll end up with a pole vaulter that will make points in our meets for us.

Q. - What kind of special upper body work do you prescribe for your vaulters?

A. - Here again maybe I'm all wet, but I don't have my vaulters do any extra body developing work outside of learning to walk on their hands. We don't even have a high-bar or parallel bars in our school. It has always been my feeling on the matter that if the boy spends a lot of time just vaulting he is going to give those muscles used in vaulting a lot of work and development. Maybe the use of a high-bar or rope climb would be beneficial but we haven't used them as yet.

Q. - What type of pole carry do you feel is best?

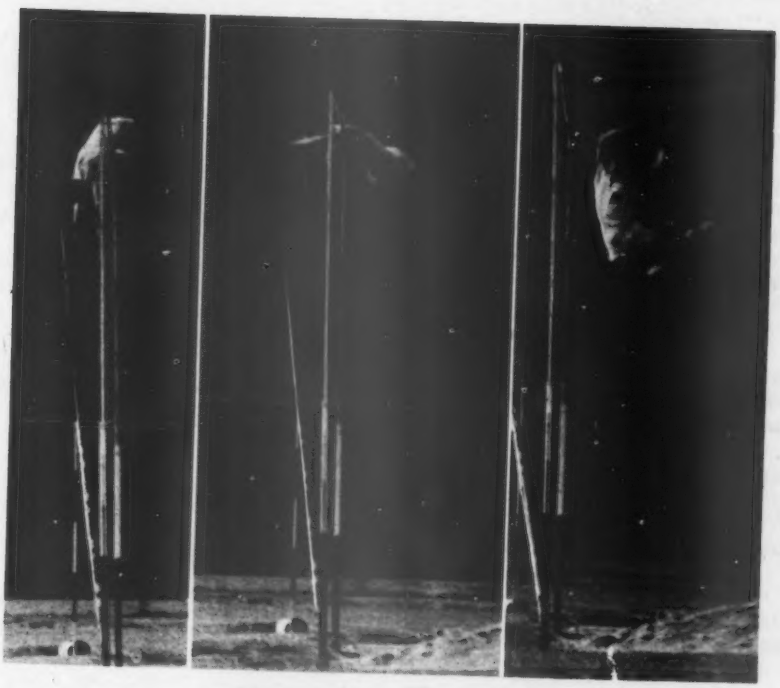
A. - I like the pole carried parallel to the ground, with the tip slightly elevated and carried diagonally across the body. Carrying the pole across the front of the body like this, I feel, gives the vaulter greater freedom in the shoulders and prevents them from tightening up. Carrying the pole at the side is an unnatural movement and makes it much more difficult to run with.

Q. - How far apart should the hands be on the pole carry?

A. - Not less than 2 feet nor more than 3'6" should separate the hands on the pole. At best the hands should be about 3 feet apart. A good rule to follow is, "The closer the hands together the heavier the pole, the farther apart the hands, the lighter the pole".

Q. - How long a run should a vaulter use?

A. - It depends a lot on the vaulter. Generally speaking a run of over 100 feet is recommended. Timmy Helms, our best vaulter, used a run of 128 feet while our second vaulter this year, Bill Norrish (12'8) used only 97 feet. McDaniels of Turlock, with a best of 13'4 also used less than 100 feet. However, I feel with a longer run a vaulter has more time to relax and doesn't have to hurry things at the last. We like our vaulters to start slow and finish fast.



BOB RICHARDS

Q. - How should the pole be planted?

A. - With the pole well out in front and the hands over the head. One major fault of many high school vaulters is that they have the pole down on their right shoulder when they plant.

Q. - How important is the take off?

A. - It is about 85% of the vault. Nine times out of ten a good take off means a good jump. Ask anyone that has ever done any vaulting and they will tell you that there is a certain feeling on some vaults when you leave the ground you say to yourself, "This is it, it's going to be a good one". You can tell the minute you leave the ground that the vault was right. By all means the vaulter should check his take-off spot after each jump by placing his foot on the spike marks where he took off.

Q. - What is he doing wrong if he's getting his height in front of the bar?

A. - It could be a number of things, but chances are he is holding too high or taking off too far back.

Q. - What is he doing wrong if he keeps coming down on the bar?

A. - There again it could be a number of things, but check for lack of speed on this.

Q. - What is he doing wrong if he swings up into the bar?

A. - Check for too close a take-off or too low a hand hold.

Q. - How high should a vaulter hold?

A. - This is of course determined by how tall he is, how fast he can run and how strong he is. As a rule the higher you can hold the higher you can jump. A boy should gradually work his hand hold up until he is holding his maximum. That is, until he can get off the ground without a jerk.

Q. - How do you get a vaulter to turn over?

A. - During the pull, have him kick his right foot hard toward the left standard.

Q. - How do you correct a cross footed or wrong footed vaulter?

A. - You don't.... If a boy has started to vault that way you might as well be resigned to the fact that you are going to have a right footed vaulter. There have been some pretty good cross-footed vaulters. Bill Larson of Stanford made 14' in 1948 and Dick Hibner of Fresno State was a 14 footer during the '51 season, Our own Bill Norrish took off on the wrong foot. Who's to say? Maybe they're right and we're wrong. Someday a right-footed vaulter will come along and do 16 feet and everyone will change over then.

Q. - What are your training methods?

A. - After the fundamentals are learned, our vaulters jump for height every day, during the early and mid season. During the late season they vault once a week or none at all depending on how they feel. The rest of the time is spent on sprinting or working on the other events.

Q. - Can a boy talk himself over a height?

A. - Yes, Believe it or not he actually can, if he has the physical ability to make it. We teach our vaulters to use positive thinking, to actually talk themselves into making a difficult height. It will work; try it.

If I have added one bit of new information to you that will make coaching your pole vaulters easier for you, then I will feel that my task has been successful.

THE TRAINING PROGRAM AND BROAD JUMPING OF GREG BELL

by: Gordon Fisher
Indiana University

Thank you, Bud, for your fine introduction. It is a pleasure to be a part of this great program and I hope I shall be able to contribute something of value to it.

A broad jumper is in competition with two very potentforces of nature, namely, inertia and gravity. To be successful in his event, therefore, he must be a pretty good sprinter and a reasonably good high jumper.

Greg Bell is a relatively short man, about five feet eight and one-half inches in height. He can sprint the hundred in about 9.7 to 9.8 and if we worked at it, I should imagine that he could high jump about 6' 2". Obviously there have been many good jumpers who have been both faster sprinters and better high jumpers than Greg so if this boy is to be a top-notcher, it is evident that he will have to gain his efficiency in ways other than those of simple speed or jumping ability.

Let's break down the total job into its component parts. Greg starts his approach about 130 feet from the takeoff board and after two or three short steps, that is, about the 120 mark he goes wide open. The 120 foot mark is his only real check mark although at about 50 feet from the board he has some kind of an indicator at which he aims to relax in his run. It is not quite correct to call this last 50 feet a "coasting" run but there is a definite attempt to come into his takeoff area somewhat relaxed and with a partial shortening of stride.

As for his takeoff, we feel that Greg's last two strides are somewhat too long and they may possibly be somewhat in error also because of the fact that he tends to veer strongly to the right with his left foot, the takeoff foot, planted somewhat to the right side of the board.

It is our wish to have Greg's vision up just before he comes to the board. This system of takeoff is adhered to unless a bad runway, changing wind or some such condition makes it necessary for him to keep his eyes on the board.

Greg uses the hitch-kick or alternating leg action in his flight through the air. The final part of his jump is an attempt to bring his feet and legs to a position just as far forward as he can without a loss of balance to the rear as he lands in the pit. He normally lands in a straightforward position, but if the pit does not hold him he will land with his body to the right and in a side falling position.

(Here Mr. Fisher showed some moving pictures of Greg Bell, one series showing him jumping indoors with views from one side and from the front, and another series showing him outdoors with views from both sides and from the front.)

As for his practice, Greg does a lot of short-run form jumping with a run of about 50 to 60 feet. He does a great deal of calisthenic exercising and he does quite a lot of crossbar jumping from a short-run broad jump approach, straight in front, going to heights of close to six feet in this manner. Most of all, Greg runs. He does many repeat 80's, lots of 110's and quite a few 220's and 440's. In most of this running he attempts to simulate the stride he expects to use on the broad jump runway. He likes to run, even on the mile relay team as well as in sprint races. He does very little broad jumping, only to check steps and to correct errors.

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(Question) What advantage do you find in the hitch-kick? (Answer) Greg says he feels better in the air because he is used to it. He also feels that he gets a better landing position with his feet out when he moves his feet during the jump. He says that this keeps him from getting tense, that is, if he doesn't have to hold his knees up.

Mr. Nett questioned the "coast" at the end of the run. He said that Lutz Long started strong, coasted in the middle of the run and then picked up. (Answer) It's not a coast, just an attempt to relax.

(Question) You mentioned your boys jumping the crossbar. Do they jump into the pit? (Answer) Yes. Greg has done a measured 5' 10½".

(Question) Have you ever timed his run? (Answer) No, but he has been timed in 9.7 and 9.8 or the 100.

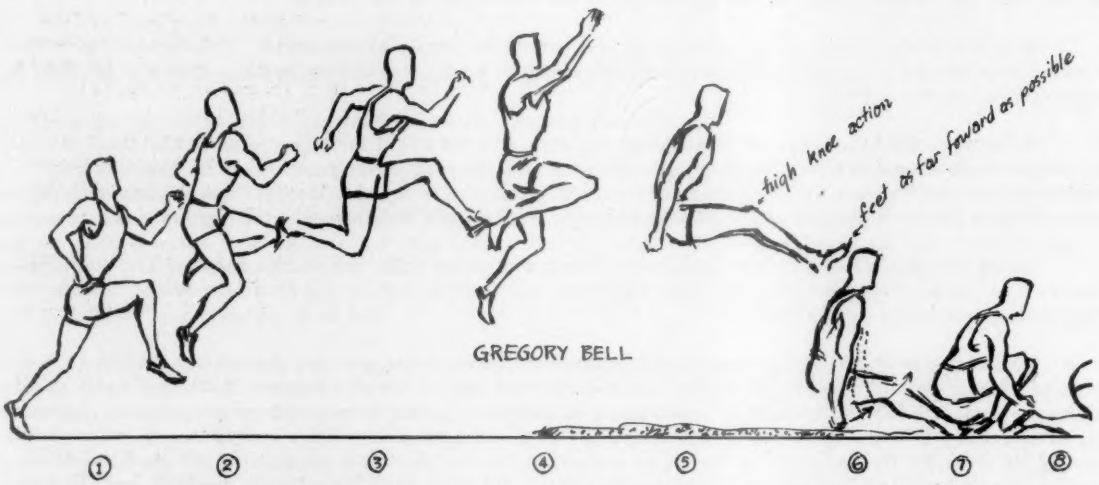
(Question from Larry Snyder) Does he veer to the right in order to get more leverage on his left leg? (Answer) I don't think so. Actually, I think he got into the habit by trying to stay away from the steel and canvas wall that lines the runway indoors.

(Question) What about breathing and arm action? (Answer) We pay no attention to that since he is a sprinter. He does have a rather peculiar arm action in his landing but we don't know the reason for it.

(Question) Does he shorten the last stride or two? (Answer) No. We'd like to have him do that; his last strides are too long.

(Question) Does he practice only the running and the little jumping you mentioned? No weight lifting or calisthenics? (Answer) No. The only calisthenics he does are for stretching during the warmup.

Larry Snyder remarked that Bell is able to get the advantage of the "hang" style better than any hitch-kicker he has ever seen. "He raises and reaches everything up." Fisher asked about Jesse Owens' run. Snyder said that Owens used a check mark at 108 feet early in the season but later in the season he used only one mark and a line to mark his first step. Ken Doherty remarked about a similarity in the takeoff in the jumping of both Owens and Bell. "They ran off the board rather than jumped". Snyder said that Owens had no definite foot-stamp. He said that in Owens' case also, they had attempted to shorten his last stride in practice but that they did not emphasize it in meets.



THE ALTERNATING FOOT AND LEG OR "HITCH-KICK" METHOD USED BY BELL

TOM TUBBOCK

RUNNING BROAD JUMP

By Melvin Shimek
Marquette University

This opportunity to speak to a group of track-minded individuals about a former track athlete of mine is indeed a great pleasure.

I am not a specialist in any track event, but the contacts I have made in working with my former protege may, I hope, help you in coaching this particular event.

John Bennett, a graduate of Marquette University and at present in the service of our country, is an example of a brilliant broad jumper. He is 25 years old, 5'8" tall and weighs 145 pounds. You may be interested in hearing a few of his accomplishments during these past few years. John was National Collegiate Champion in 1953 and 1954; A. A. U. Outdoor Champion in 1954; went on a European Summer Tour in 1953; competed in the Pan American Games in 1955; went on a South American Tour in 1955, and another European Tour in 1955.

The best all-time jump of this young man to date is 26'3-3/8" and his ambition is to become a member of the 1956 Olympic Team.

Before I discuss the form of this young man, it might be well to mention a few words about his training program. No two individual competitors operate the same in the broad jump. The general procedure, including a run, take-off, and dismount are the same for all, but the physical technique required to produce distance will differ. At the start of the indoor seasons, John was classified as a sprinter. This classification continued for about three or four weeks. Gun block starts were a part of the early season training. I mention this because many are of the opinion that starts tend to place too much strain on the knees. After the early season training, more stress is placed on step work and general broad jump work. John and I found that block work at the start of the training program develops strong knee and leg muscles as well as good reflexes. We are also of the opinion that charging out of blocks can be a small introduction to the impact experience on the take-off board. Lack of an indoor pit made it impossible to do any actual practice jumping and, as a result, John worked on the high jump. Any type of work to build up that take-off leg was our big indoor problem. Fortunately, this competitor could adjust himself to steps in competition without too much difficulty; however, the lack of facilities did hurt his efficiency as well as confidence, and the distances attained during the indoor seasons were not the best. During indoor dual competition, John worked in the dash, high jump and broad jump.

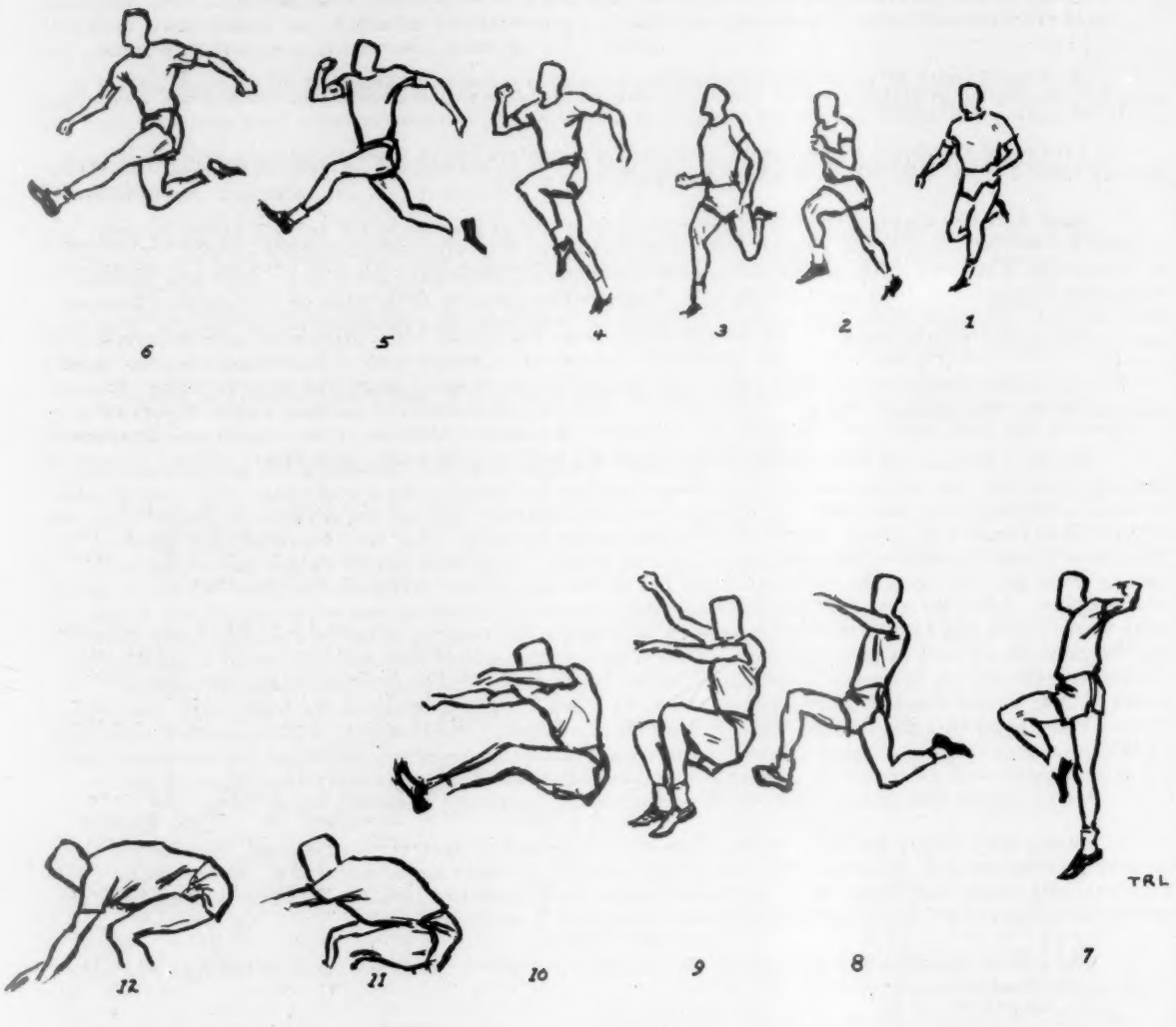
During the outdoor seasons, Bennett worked on a modified sprinter's schedule. The opportunity to work on step and pop-up jumps and concentration on the lift were major activities. He was very active in dual meets and competed in the Broad Jump, High Jump and Javelin. His best successful high jump attempt was 6'5". He could negotiate 100 yards in 9.8 seconds.

The athlete mentioned is a "Walk in the Air Style Jumper". He is the coordinated type who does combine speed with a beautiful lift.

The average jumper is usually blessed with spring or speed and when gifted with both, the net result is usually an outstanding jumper. John's competitive desire to win and his confidence make him outstanding when the going is "tough". Relaxation under competitive stress could be classed as one of his many assets.

At this time, it might be well to mention that John, because of his stature and physical make-up, cannot be worked like many athletes who possess a more rugged physique. Bennett reaches competitive condition quickly and after this period his workouts are short in duration. Concentration is centered on step and pop-up jumps with a short run. Height is a much used word in these workouts.

Bennett uses an approach of 139'5". He employs a starting marker at 118'5", which is approached with a 21' run. His second marker is located at a point 68'5" from the board. The complete run measures 139'5". Bennett is a floating type sprinter, and is effortless and most relaxed. To me, it looks as though John never runs at full effort down the run way. I am convinced that his running is about 75 to 80 per cent of his full effort. He can generate speed quickly, but has found that gradual accelera-



MEL SHIMEK, MARQUETTE UNIV.
BENNETT'S BROADJUMPING FORM

tion and retention of a relaxed run helps develop a better take-off. At times the approach run has to be stressed becaused of outward knee action which affects his effortless stride. He has little difficulty hitting his step markers and, as a result, never has a great deal of difficulty at the board. Of course, adjustments have to be made due to weather conditions. At the 68' mark he seems to have an uncanny conception of distance to the board and small step adjustments to his stride occur without undue harm. The last two strides before take-off are slightly shorter than the preceding strides and the last stride is usually about 6'4" in length.

Bennett uses a definite float the last three or four strides prior to take-off. We always feel that this float is the most important part of his jumping success. Many competitors today are unable to master the use of a float, which we sometimes call a relaxation period before an all-out effort. The average athlete doesn't know the physical aspects of the term "float" and, as a result, speed is retarded and performance suffers accordingly. In the float area, the jumper's eyes should not be fixed on this board, but should be directed ahead. This will help to keep the upper body in an erect position at the board.

The take-off board seems to be the big problem for the average broad jumper. It is usually a mental hazard to most competitors. In this respect, John has little difficulty. He jumps from his right foot and it can justly be said that he uses tremendous power on the foot plant. He does not "slap" his take-off foot on the board, but in turn starts the plant with a combination of the heel and back spikes of the shoe. A roll from that point ends high on the ball of his foot. John always liked the two back spikes of his shoe at full length and he felt this gave him aid on the roll to the ball of his foot.

Bennett is of the opinion that this type of take-off allows the jumper more time on the board, giving him just a fraction of extra time to make several adjustments such as leg kick, knee flex, thrust and lift. I might say that a special heel pad is used for the take-off foot to eliminate heel trouble. Heel trouble is not uncommon in the broad jump, and protection before the injury is the best remedy.

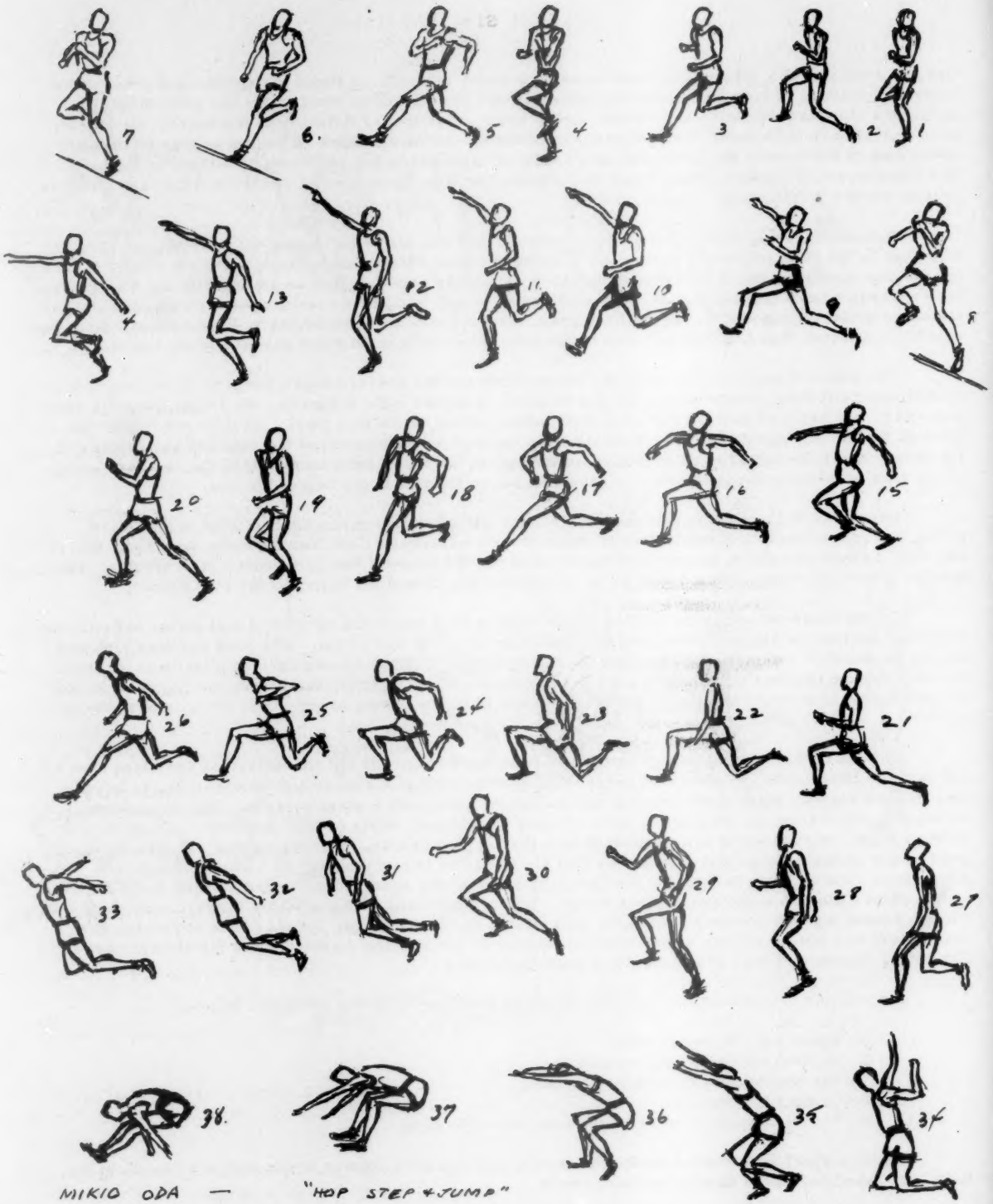
On the board take-off, the driving leg is slightly bent due to the shortened last stride and with the heel to toe action the leg will straighten and a definite body lift will occur. The head remains high and the leg is extended vertically to stimulate the lifting action. The arms are carried slightly aside from the body to also help in the lift effect. As the foot comes in contact with the board, the jumper's center of gravity moves forward and the greatest lift occurs when the center of gravity is directly over the take-off foot.

The lift of the free leg is high and the walk action through the air characterizes very high knee lift with the coordination of wide arm carry which promotes high elevation and balance. It can be said that Bennett actually takes three steps in the air before going into a squat position. The upper body is in an erect position from the time of the take-off until the descent starts for the dismount. The arm carry, through flight, is wide and well coordinated with the leg movements. This young man reaches extremely good height on most jumps and I would say that his elevation is much higher than most competitors. After three running steps in the air, the athlete works into his squat position, arms swing forward, and at this point elevation stops and descent starts. Upper body leans forward with a forward stretch of the arms. I think that John doesn't extend his legs enough on the dismount. He may have corrected this since I last saw him in action, because he has increased his jumping distance since his college career. His actual dismount is well balanced with a good leg spread.

I would like to summarize John's great jumping ability by giving you these factors:

1. Speed and lift coordination.
2. Natural ability to stay relaxed.
3. His adaptability to the use of a float.
4. Competitive desire.
5. Visual conception in relation to the take-off board.

I have a short film which I would like to run, and watching John in action will show some of the form technique that I have tried to put into words.



MIKIO ODA — "HOP STEP + JUMP"

THE HOP, STEP AND JUMP

By Mikio Oda
Japan

It is a great honor for me to be granted this opportunity to speak to you on the hop, step and jump and I hope I can properly convey to you my ideas on this subject.

Over six feet has been added to the world record in this event since I first started jumping some 30 years ago and I think that new records are still possible. In fact, I believe a mark of 55 feet will be made some day.

There are various techniques for H-S-J, but I should like to convey to you the prevalent techniques in Japan, to be differentiated from those of Brazil. There are two main principles we follow in Japan in teaching the hop, step and jump. One is to bend the leg and bring up the knee high while in the air on both the hop and step. The other is to strike the ground with force after stretching the leg sharply just before landing.

Form differs, even among the Japanese, just as one's body is different from another's.

We do not force athletes to adopt the same form, but try to develop their strong points. But in any case, I personally think that bending the knees properly is the most important principle for this jump.

I will speak on the hop, the step, the jump, proportions of the three and the training techniques.

The present method is to place special effort on a longer step rather than the hop. This balances the hop, step and jump, extending the total length without cutting down momentum at any stage of the triple jump.

An important rule of the hop is to keep low. If one hops too high, the body and legs become straight and knee bending is impossible.

There must also be a feeling of going forward on the hop, rather than going upward.

For the hop take-off, lean forward more than for the broad jump, but not too much as it will be hard to bring forward the take-off leg.

The body can be a little more erect at the finish of the hop than at the take-off because one goes higher on the step. At this point the body position will now be similar to that of the broad jump take-off.

Some jumpers try to extend their hop by swinging an arm upward, but this cuts their momentum. It is better to swing the arms to keep balance.

It is necessary to keep the body erect, not only during the hop, but also in the step and jump. This can be clearly seen in the style of daSilva and Scherbakov, current champions.

Landing on the toe is recommended for the end of the hop and take-off for the step, although some athletes land on their heels. I feel forward momentum is lost by landing this way.

The step is started by swinging the knee of the free leg forward, bending both legs immediately after the take-off.

During the step, both arms should not be held behind the body, as this causes the body to fall forward, often spoiling the jump take-off. Both Scherbakov of the Soviet Union and Japan's best man, Kogake, have this fault.

Some jumpers add a kick with the free leg during the step, swinging it forward again for the jump take-off. Most jumpers who do this are small. Iimuro, a Japanese who took sixth place at the Helsinki Olympics, kicks like this.

On the jump one goes as high as possible, swinging both legs forward for the landing. There are some who again kick in the air.

One's body also tends to fall forward in the jump, but this can be avoided by bringing the body erect on the take-off.

In order to bend back the body, we have adopted a method of raising the arms upward from behind. The head should not be pushed ahead, but bent backwards with the eyes looking skyward as in the broad jump.

As to the question of which leg to start with in this event, it is generally considered better to use the leg which is stronger in order to take advantage of it for both the hop and step.

However, this is not an absolute rule. With adequate training, one should be able to jump as well with either leg. DaSilva of Brazil takes off with the weaker leg on the hop, jumping with his stronger leg.

It is possible a longer jump can be made on the strong leg because it is easier to maintain balance on it at this point.

In Japan some have succeeded in starting with their weak leg, but I think a strong leg take-off is better if there is much difference in strength between the two.

As to the proportion between hop, step and jump, there is no exact rule.

A careful look at the records reveals that no expert jumps the same proportion every time.

Take for instance daSilva, holder of the world record. At one time his hop is long, another time it is short, but there is very little difference in the total length of his jumps.

When he went 53 feet 2 5/8 inches in Helsinki in 1952, his hop was 20 1/2 feet, his step 15 1/2 feet, his jump 17 1/4 feet. Two years later when he again jumped the same length, his hop was up to 21 1/4 feet, his step down below 14 feet, and his jump nearly 18 feet.

Studying the records I have noticed that when the hop is long, the step becomes shorter, but the jump is again longer. Therefore, I see no need to set any definite proportion for the three jumps, since there will be only a small difference in the total jump, if any.

Scherbakov of Russia says he tries to hop 20 ft. 4 inches, step 16 ft. 9 inches and jump 17 feet. Maybe this is the ideal proportion.

I plan to have Kogake hop 19 ft. step 16 ft. and jump 17 feet, gradually extending his hop and step until he can go 53 feet.

When I started jumping 30 years ago my first goal was 19 1/2, 13 1/2 and 16 feet for a total of 49 feet.

Then when I tried for a world record, I changed this to 21, 14 and 16 feet. If I had adopted the present method of extending the step by reducing the hop, I feel sure I could have easily set a better world record.

In 1936 Tajima of Japan started the new trend for a long step when his Berlin Olympic record of 52 feet 5 7/8 inches included a middle leap of 15 feet 5 inches.

Since the end of the war, I have taught Japanese jumpers to make more use of speed in an effort to gain a longer step.

Broad jump ability of an athlete must be taken into consideration when deciding on the proper proportion. None of the present Japanese hop, step and jumpers can broad jump more that 24 feet. As their mark is closer to 23 feet, it would be dangerous to make them hop too far.

Nambu and Tajima were able to broad jump over 25 feet and so could easily hop 20 feet. If these two had concentrated on this event, they could have made over 53 feet. Furthermore, if they had been able to use present day methods, they may have jumped still more--more than 54 feet.

Very few hop, step and jumpers in the world can broad jump over 24 feet. If a 25-foot broadjumper practices the hop, step and jump, a new world's record is possible.

In the hop, step and jump, bending and unbending the knees between jumps is a matter of a moment. Therefore, the approach run must be made so as to permit this bending and unbending.

High knee action is the answer. Without it, you will find it difficult to bring up the knee immediately after the take-off.

On his approaches, Tajima tried to churn his legs ahead of his body. To do this he led each stride with his heels instead of his toes.

Of course, he did not land on his heel, but the moment his foot left the ground he kicked his heel up against his body before he pushed it outward.

To run like this the body has to be erect, but with not too much effort to keep it so.

As to the motion of the arms, a full swing is necessary. Lifting the knees will become difficult if the arms are kept behind the body.

I used to swing my arms up and down. Last year, Chen of Soviet Russia kept his fists close together in front of his body and moved them up and down. This method was something new and seemed perfect for high knee action.

Now I would like to take up the matter of training techniques.

Beginners should start with some practice on how to bend the knees. Squat down and then come up on one leg without unbending the other.

a. Now, stand on one leg and bend the other.
b. Next, stand on one leg, jump and bend it. Don't try to jump high, only enough for a high knee bend.
c. Hop on one leg, bringing up the knee and bending the leg as much as possible on each hop.
d. After a little of these exercises, then try some standing hop, step and jumps. Start this practice this way:

1. First, take long steps, bending the knee slightly and putting the weight forward to gain the feeling of moving ahead.
2. Next, add a jump motion and practice the hop, then the step, and the jump.
3. Then try standing hop, step and jumps. Make sure not to lean forward.

When this jump is mastered, start running jumps. A run of 4 to 5 yards is enough.

4. Take a small hop as low as possible, stretch for a powerful step and leap as high as possible when going into the jump.

I advise a definite limit on the hop, say 10 feet. Practice on step take-offs from this 10-foot mark will teach the jumper the trick of saving his energy on the hop.

When the jumper gets the right form and is able to step fairly long, make the approach run 10 yards and the hop limit about 13 feet. Gradually increase both as the jumper improves. Correct form can be taught very fast by this method of adjusting the length of the approach and hop together.

Practicing the broad jump on the weaker leg is also good training for the jump. Practicing just the step and jump is also good.

When you have extended the run to about 20 yards and have taken off the hop limit, the jumper is ready to try for distance. He should be able to do fairly well already.

Practicing the hop may now be necessary as the speed developed by the longer approach may affect his hop form.

Last year a G. I. stationed in Japan, was taught to practice this way and in a very short time he was able to jump over 40 feet even though he could not broadjump more than 20 feet. His legs were not considered too strong, but I was told he jumped over 45 feet after practicing only one month.

Many have improved their marks as much as three feet in a very short time by this training method.

In training for the hop, step and jump, I stress development of the legs as much as technique.

By leg development, I mean the development of one's ability to support the body on one leg and increase of leg strength.

Jumping on one leg is good training. But it is better to hop on one leg for 50 to 100 yards, not going up too high, but bending that leg and bringing the knee high on each hop.

Also try to hop, hop and jump on the strong leg at the sand pit. Last winter, I had Kogake train this way and now he can hop, hop and jump nearly 50 feet.

Broadjumping alternately with either leg is also good training for development of leg strength.

Repeated jumping of any kind naturally strengthens the legs. In their efforts to develop their legs, some try to run on one leg while others tie weights or sand bags around their waists and jump down from platforms, landing on one leg.

Iimuro, who is about 5 feet 4 inches, can jump nearly 51 feet, even though he can not broad jump more than 23 feet or run the 100-meters in less than 11.6 seconds. He says he uses this jump-with-weight training method for developing his legs.

No one can excel in the hop, step and jump unless he trains to run the 200-meter sprint. This helps in the approach run and also makes the hips stronger.

Hurdling is also good. It improves his timing on take-offs and teaches control of the body in the air.

Shot putting and hammer-throwing can help develop the legs and improve stretching ability.

This completes this broad outline on the hop, step and jump. The event is really not too difficult to learn but it takes considerable time to achieve perfection.

Last Saturday I was privileged to observe the U.S. jumpers. If these boys add what I have suggested thus far to what they already know, I believe they would show much improvement. In particular, Sharp appears quite promising as I observed him. His jumping technique is almost the same as that of daSilva of Brazil. I might suggest two points that may be improved: he hops too high so it might be helpful if he made a little lower hop and a little longer step. The other point is that he leans forward slightly too much so I would suggest that he brings his body upward.

I have a movie film with me of Kogake and two other men who have jumped more that 49 feet. At the end of the film you will see a picture of Kogake and the hop, step and jump in which he made his record of 52 feet 8 inches in May of 1956.

In closing, may I express my appreciation to you for giving me this time and I am happy to have been able to speak to you on the hop, step and jump. Thank you very much.

Question: How about the training of the legs?
Answer: Running, exercises, hopping and jumping.

Question: How about weight lifting?
Answer: I have nothing definite but almost anything helps, e.g., jumping down from a height on one leg, possibly with weights as I suggested.

Question: Did Mr. Oda say that the length of each part of the jump did not matter, that it ended up the same total?
Answer: Yes, within certain limits.

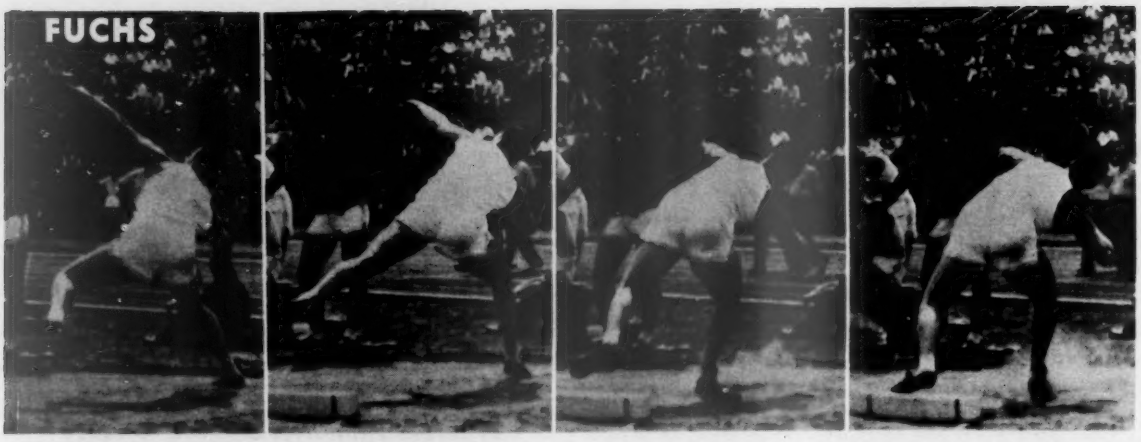
Question: Compare the run and approach in the broad jump and the hop, step and jump?
Answer: They are much the same but in the H-S-J you slow down slightly.

Question: What is the action of the take-off foot on each of the three jumps?
Answer: Ball, heel, roll and lift.

Question: Is there any reason why a man should specialize in either the BJ or HSJ or will it do any harm to do both?
Answer: In Japan many men do both.

Question: How long an approach does your top man take?
Answer: Approximately 130 feet.

Boris Zambrimborts



In Illustration 1, Jim Fuchs (Yale) shows a rather orthodox start, but in Illustration 2 we notice his right foot has turned so that his heel is pointing toward the toe board. In doing this, he is lifting up over his knee, with his back toward the toe board instead of his left side, this giving him a better chance to use his leg lift. Fuchs has thrown his left leg straight across the ring with an upward thrust to give him more speed. In Illustrations 3, 4, and 5, he has

kept his body low over his right leg in order to give a long lift. In Illustration 6, he appears to be off balance just a little, but he has given a tremendous push off his right leg and kept his feet in alignment to avoid opening up his stance too soon. In Illustrations 7 and 8, Fuchs lifts the shot well over his shoulder, following through from his right leg to his left. In Illustrations 9 and 10, we

see one of the reasons Fuchs has thrown more than a foot farther than O'Brien and Hooper. He follows through and gets a last lift from his left leg which adds a great deal to the length of his drive and follow-through.

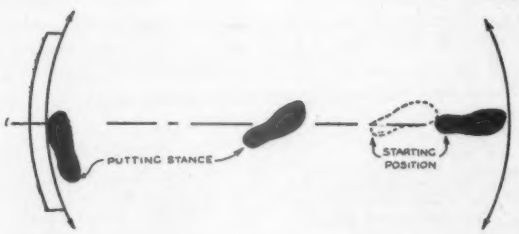
SHOT PUTTING

By: George Rider
Miami University of Ohio

Name	Height	Weight	Age	Time	Distance
O'Brien, P.	6'3"	223	24	9.9	61'4"
Nieder, W.	6'2½"	225	22	10.3	60'3-3/4"
Bantum, K.	6'6"	235	21	15. (HH)	60'½"
Jones, T	6'5"	245	24	11.	59'1"
Fuchs, J.	6'1½"	224	22	9.8	58'10-3/4"
Fonville, C.	6'2"	195	20	10.	58'3/8"

The above figures would seem to offer objective evidence of some of the physical requirements necessary for top performance in shot-putting. Other essentials are a high degree of explosive power, great strength and quickness of muscle action coupled with the ability to concentrate one's energies on competitive performance. One must also have a burning desire for perfection of all the aspects of form approved by the experts. In addition, one must live cleanly, train diligently and make whatever personal sacrifices deemed necessary to reach one's maximum potential. Such a person will constantly be a threat to existing records. Since it normally requires years of thoughtful, intelligent and purposeful study and right practice to become a good shot-putter, it seems obvious that there is no short cut to championship performance. It requires time and energy, study, analysis, right practice, work, work, and more work.

FOOT PLACEMENT OF PRESENT DAY SHOT-PUTTERS



The Technique of Shot-Putting: Even though there are some differences in good form as demonstrated by such men as Fuchs and Fonville on the one hand and by O'Brien, Jones and Nieder on the other, I believe the essentials are near enough alike to make a single outline of the style being used by the present champions adequate and not too confusing.

How To Hold The Shot: A large hand, strong fingers and a strong wrist are recognized assets in good shot-putting. With such a hand it is possible to hold the shot well up on the base of the first three fingers with the thumb in front to help hold it as high as the strength of the fingers and wrist will permit. Holding the shot high on the fingers permits a wrist snap and a finger flip at the terminal or muzzle end of the delivery which will add distance to the put. The place the shot is held in relation to the neck seems to be governed largely by the length of arm bones and the size of the arm muscles.

Normally, it is held resting against the neck and clavicle a bit under the ear with the elbow pointing outward and downward. If the shot can be controlled a little farther out over the shoulder tip, it is possible to attain greater terminal velocity which is directly related to distance. It, however, must be held firmly in position as one shifts across the circle, but never with tense muscles. Relaxation is essential, but it must be relaxation under control.

Starting Position: The start is very important since the distance traveled (seven feet) and the small time interval, (about three-fifths of a second), make it difficult if not impossible to correct any movement once started. Consistency in putting is therefore quite essential. It is also necessary to establish a nerve pattern so that after a certain sequence of movements, the put is started more or less automatically and always follows the same pattern.

When preparing for the put, one should carry the shot in his left hand in order to keep his right hand and wrist loose and relaxed He now takes a position at the back of the circle facing directly back or opposite to the direction of the put. The right foot is placed nearly straight back with the left leg extended slightly toward the front of the circle with the toe lightly touching the ground to help establish and maintain balance at the start. While in this position, the athlete stands erect in a semi-relaxed state while he readies himself for the shift or glide across the circle. It is very important at this point that the athlete concentrate completely on the balanced action that is to follow. He should take no more time in this starting position than necessary to ready himself for the action to follow.

The Shift or Glide Across The Circle: In preparing for the shift across the circle there are four general principles to follow: The first is that the longer the distance through which power can be applied to the shot, the farther it is likely to go. The second is that, assuming there is good form and balance, the more momentum one can generate across the circle and on into the delivery of the shot, the farther the shot is likely to go. The third is that the speed and momentum gathered in going across the circle must not be lost, but must be combined with the power and speed of the putting action. The fourth is that the body must move in the direction that the shot is going to be thrown and in a single vertical plane.

In attempting to apply these principles to the shift across the circle, the athlete standing erect and relaxed at the back of the circle, lowers his head and shoulders to a point where his back is nearly horizontal, with his eyes focused on a spot directly behind the circle. As he lowers to this position, he bends his right knee to the point of greatest lifting power, and rocks back until his weight is well over the ball of the right foot. This places the position of the shot perhaps as much as two feet back of the rear of the circle which allows for that much more distance through which power can be applied to the shot in advancing across the circle. It also places him in a position of balance ready to move forward. At this point, in order that he may gain momentum across the circle, he allows the weight of his body to start falling toward the toe-board and just as his weight starts to fall forward, he makes a powerful drive forward off his right leg and foot with a simultaneous kick of the left leg straight ahead and slightly to the left center of the toe-board. This weight shift combined with the drive and kick results in a low fast glide across the circle. This glide or shift should move the athlete straight forward in a single vertical plane to a point where his right foot is near the center of the circle pointing back at about a forty-five degree angle. The left foot should be against the toe-board slightly to the left of center. The body position of the athlete should now be approximately the same as it was when starting the shift from the back of the circle. The back will be nearly horizontal, his weight well back over the right foot which is planted firmly and flat with the left foot against the toe-board. To achieve the third principle, it is essential that when the shift is completed, there be no pause of settling or cocking of the shoulder, but that the shift be tied in with the putting action and the delivery of the shot.

The Delivery: It is essential there be no puase or hesitation between the shift and the delivery. The delivery is a sequence of movements from the foot to the tip of the fingers. It starts as soon as the right foot is planted in the center of the circle. There should be no rotation or "cocking" of the right shoulder and arm at the end of the shift, because it decreases the velocity developed by the shift. The faster the shot is traveling as it leaves the fingers, the greater will be the horizontal distance. Consequently, any action that will in anyway diminish the terminal or muzzle velocity such as "cocking" the shoulder at the end of the shift is detrimental to maximum distance.

If maximum distance is to be attained, there must be a coordinating of all the forces propelling the shot. The right foot lands slightly before the left and consequently, the right foot and leg begin pushing against the ground before the left foot has landed. This permits a rock up onto the left foot. The extension of the right leg together with the pivot forward of the right foot is a lifting action which

drives the entire weight of the body up and over a semi-straight left leg. The powerful back and trunk muscles add force to the leg drive. This lift and explosive drive passes to the chest, shoulder girdle, and finally to the muscles of the arm with the shot being thrown up and out, never just out. The arm thrust is delayed until the trunk rotation is nearly completed. As the arm thrust is made, the weight of the body is well over a semi-straight left leg which straightens forcibly, giving some added impetus as the right arm and shoulder move into complete extension.

The right elbow must be directly behind the shot during the extension of the throwing arm, and the left elbow is brought back and down rather forcibly. A wrist snap and a finger flip at the end of the put will add distance to the effort.

Newton's third law of motion: "Actions and reactions are equal and opposite," indicates that in delivering the shot, the right foot should not leave the ground before the shot leaves the fingertips or some of the driving force will be lost. In other words, put with both feet on the ground.

Summarizing the sequence of actions in delivering the shot, it may be simply stated as a lift, a pivot and an explosive push.

The Reverse: The reverse should be considered the consequence of the throw, not part of it. It is used principally to keep the thrower from fouling after the shot has been released. A good shot-putter gains distance not by reversing, but by following the shot over the toe-board so far that it is necessary to reverse to stay in the circle. The technique of the reverse is simply replacing the left foot with the right with the outer edge of the right foot moving up to the inner edge of the toe-board. The left foot leaves the ground a split second later than the right foot and swings backward and downward.

General Information

Angle of Release. It is generally agreed that the release of the shot should be somewhere between 40 and 45 degrees with the level ground. Experimental evidence by Cureton found the optimum angle to be approximately 41 degrees. "The optimum angle according to Cureton depends upon terminal velocity and the greater the terminal velocity, the nearer the angle of release should approach 41 degrees." Experimental evidence also indicates that the angle of release increases with terminal velocity. It would appear therefore, that the best putters should throw at a slightly greater angle than the putters of average ability.

Height of Release. Experimental evidence indicates that the height of release is directly proportional to the horizontal distance when other factors are constant. It would seem, therefore, that a man six feet six inches in height who releases the shot at around seven feet will have a slight advantage over the shorter man who releases the shot at six feet six inches.

Training. There is no better exercise to develop shot putters than putting the shot. It must be remembered that only right practice makes perfect and right practice requires serious analytical thinking about every put. A workout must not consist of a repetition of errors but of a learning process. There must be a general body development program prior to competition to strengthen all those muscles involved in shot putting.

Warm-Up. It is necessary at the beginning of practice to warm up and stretch the muscles and tendons. A few short wind sprints and exercises that are similar to shot-putting action are indicated. This should not be considered a strengthening period. The work for the development of strength should always be taken at the end of the workout rather than before.

Putting from Front of Circle. This is an important part of the practice schedule and should be used to perfect the delivery. With the feet spaced in the delivery position, the putter drops back to a low crouch and then puts the shot without reversing his feet. This will teach him the need for lifting, pivoting the right foot, and pushing the shot straight forward with the right foot on the ground.

Practice Across the Circle. It seems useless to tell a shot-putter not to put for distance, because it is not consistent with the thinking of any ambitious athlete. It is possible, however, to practice putting for near maximum distance while concentrating on right technique. One must always be conscious of form in practice and never sacrifice good form for distance. Since speed across the circle is one of the essential requirements, the putter should spend a great deal of time on the shift getting perfect balance with right technique. Putting for distance in practice is good as long as the athlete concentrates on right technique. Coordination of all actions of shot-putting with speed across the circle is difficult

and consequently, it is essential that speed be increased only as the putter is able to keep it in full control. It is recognized that too fast a start across the circle often ends in a poor put. It is better to start under perfect control and gradually increase the speed so that maximum speed is reached at the end of the put.

Weight Training. We must recognize that there is a difference between weight lifting and weight training. Weight lifting is doing heavy static lifts and emphasizes strength alone. Weight training is using light weights to increase one's strength and also to decrease the length of time necessary to apply a given force. It is fast power that is needed by a shot putter, not strength alone. Power is motive force and might be considered the rate of applying strength. The faster, or the shorter period of time it takes a man to apply his strength to the shot, the greater will be its acceleration and the distance it will travel. The ultimate is reached then by increasing the strength of the man and decreasing the length of time necessary to apply that force. Since it is fast power, not mere strength that is needed by shot-putters, all exercises with weights should be done with weights light enough for quick and explosive action, never with heavy weights. Heavy weights are for the weight lifters.

Conclusion

In conclusion, I would advise shot-putters to think of practice as a learning process with the subject matter being the most efficient use of one's speed, strength, knowledge, physical conditioning and mental attitude. Of these, perhaps mental attitude is the most important. It is mental attitude and the ability to discipline oneself in practice and to rise to the greatest heights on the day of competition that determines the success of any athlete.

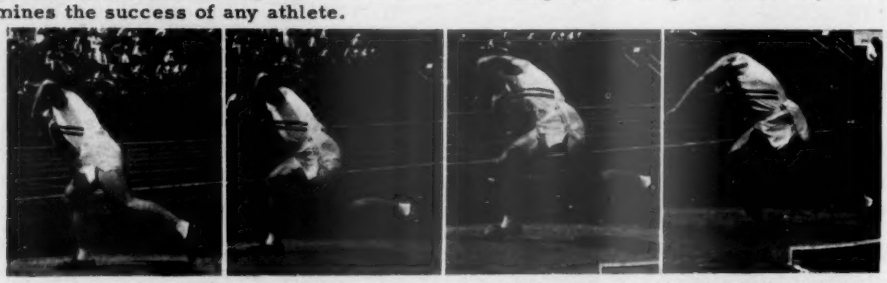
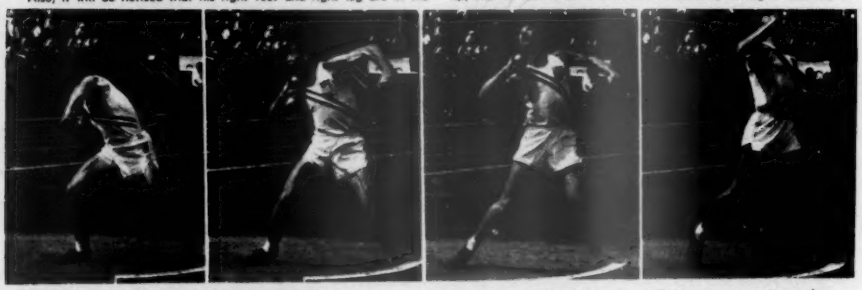


Illustration 1 of Darrow Hooper (Texas A & M) shows that he does not get as low in his starting position as do either Fuchs or O'Brien. Also, it will be noticed that his right foot and right leg are in the more orthodox position near a right angle to his hips. In Illustrations 2, 3, and 4, Hooper has thrown his left leg out rather than up, and we note that it is thrown to his left, having a tendency to



"step in the bucket." In Illustration 5, Hooper's left foot is at the left of the toe board which has a tendency to turn his hips and open his stance. This open stance will cut down the efficiency of his leg drive. In Illustrations 6 and 7, Hooper gets a tremendous drive off both legs as is shown by his leg muscles. Also, the beginning of the shoulder drive that Hooper uses rather than the

HOOPER

lift used by Fuchs is shown. In Illustrations 8 and 9, Hooper is transferring his drive from his right leg to his left leg, with a good wrist snap. Illustration 10 shows a good follow-through.

O'BRIEN'S SHOT-PUT FORM

By Jess Mortensen
University of Southern California

It is my opinion that all men cannot perfect the O'Brien form in "putting the shot". The very large, slow man will not be able to move fast enough to come out of the low starting position.

O'Brien weighs 225 pounds, is 6'3" tall, and has run the 100 in 10 flat. He is one of the fastest big men I have ever seen. His reflexes are very quick. He has developed tremendous strength in his arms, back and legs, through a well-planned program of weight lifting. He is an intelligent, determined, athlete, who is willing to work long hours to perfect his form. He has the ability to achieve peak efforts on selected occasions.

Basically, what O'Brien has achieved is the application of force to the shot over a longer distance and for a longer time, coupled with a quick explosion. O'Brien assumes a backfacing stance; the shot is held in the hand well back of the jaw line, resting on the neck just back of the ear. He stands erect with his chest well out and up. His right foot is pointed towards the rear of the ring, 180° from the direction of flight. His back is turned to the center of the toe-board , and his eyes are fixed on a point about ten feet behind the ring. Keeping his eyes on this spot behind the ring will also keep his shoulders and hips in line, and he is thus able to start the put in almost exactly the same position every time.

From his starting position, he takes a deep dip over his bent right leg, his back being almost parallel to the ground. His low dip gives him a very long lift.

As he begins his move across the ring, the left foot kicks straight up and across the ring with the knee pointing toward the ground. This high kick undoubtedly gives O'Brien more speed across the ring, and keeps him lower over his right leg.

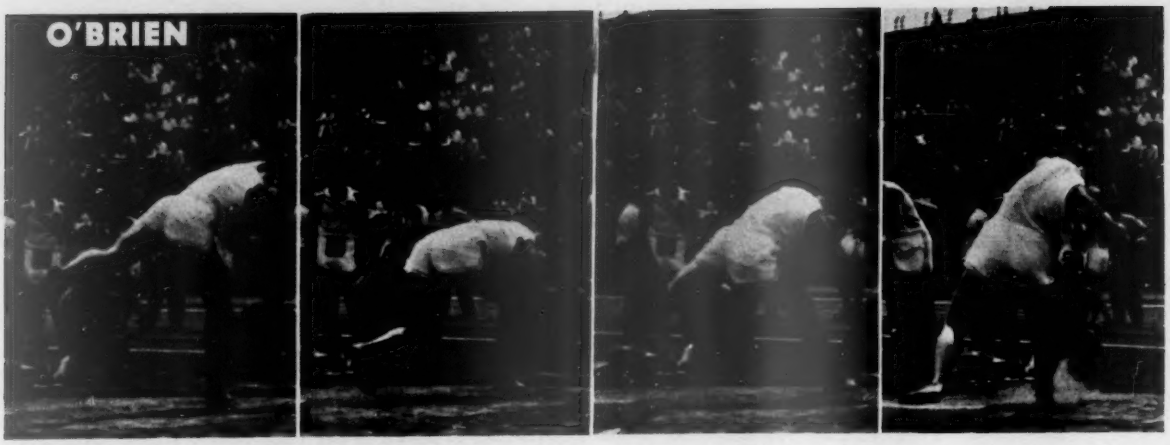
The putting position finds O'Brien with his body still facing backwards. His right foot is planted in the center of the ring, but now has come around about 35°. The left foot forms a slight angle with the toe-board , the toes being jammed against the toeboard on a line through the center of the ring and along the line of put.

O'Brien maintains the back facing position even though his right foot has moved around the 35° mentioned above. He then explodes in a combination of power and timing, swinging the shoulders and hips to the orthodox forward position. This movement is a right-to-left rotation of the hips and shoulders, plus an upward thrust off the right foot and back muscles.

Maintaining the same position of the hips and shoulders is a key factor, and speed across the ring is very important. A fast thrust, wrist and finger snap, with a good follow through over the left leg, completes the put.

With this form, you can utilize more hip drive and more lift from the abdominal region and the large muscles of the back. The longer pushing radius you get, the longer the shot is pushed by the body. The longer you push the shot, applying force against the moving object, the longer the throw will be. Actual measurements show that O'Brien gets a push 12 inches longer than the old style.

His training program includes lots of running to strengthen his legs and sprints to retain speed. His yearly program includes weight lifting, which has made him stronger and heavier.



The sequences of Parry O'Brien (U.S.C.) shows his actual 57 foot put at Randalls Island. Illustration 1 shows Parry O'Brien just before his dip over his right leg, with his back toward the toe board and his right heel also pointing toward the toe board. O'Brien's position here is more pronounced than that of either Fuchs or Hooper. Illustration 2 shows a very low dip over his right leg that will give him a very long lift. This dip also is much lower than that of the other two men. Illustration 3 shows the high kick with the left leg, and we note that it is picked straight up and across the ring, with the knee pointing toward the ground. This

high kick undoubtedly gives O'Brien more speed across the ring and keeps him low over his right leg. In Illustrations 4, 5, and 6, O'Brien has planted both feet, keeping his right shoulder low for the final thrust off his right leg. We notice here that he has turned his shoulders farther around to his right than does Fuchs. In Illustrations 7 and 8, O'Brien has pushed off his right leg, and shifted to his left, with a more circular motion of his shoulders than in a straight-over lift. Fuchs uses more of a straight-over lift. In

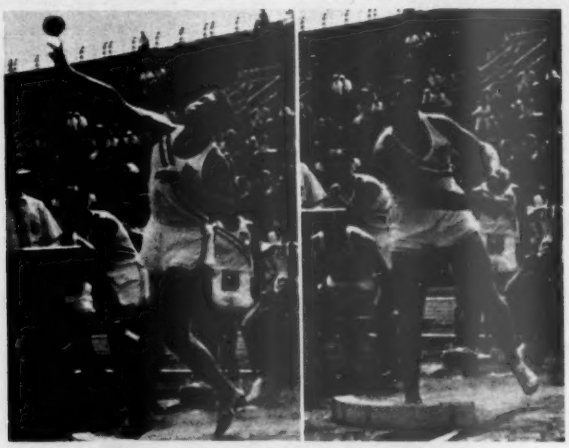


Illustration 9, O'Brien has left both feet with a fast thrust and wrist snap. It would appear that he has not received full value out of the drive from his left leg. Illustration 10 shows a good follow-through.

THROWING THE JAVELIN

By Rev. Franklin "Bud" Held

The javelin throw is similar to all other track and field events in one respect -- the difficulty of trying to describe the simple art on several pieces of paper. To one who has practiced for many years, the act of throwing a javelin is simple and easy, but to try to convey the exact procedure of this simple act to someone who is just beginning is almost an impossible task. This paper is an attempt to analyze, in logical order, the elements of javelin throwing that one particular javelin thrower considers important and necessary to the maximum achievement in this simple art.

The method of throwing described in this paper has certain unique elements in it that no other thrower uses, and for lack of better terminology it might be called the "Bud Held style."

I. PRELIMINARY CONSIDERATIONS

Shoes

It is not the intent of this paper to consider equipment, but it seems that often too little consideration is given to the shoes a thrower wears. Two things are important concerning a javelin thrower's shoes. The first is that they be very light. Light shoes are every bit as important to a javelin thrower as they are to a sprinter, because the greatest hidden potential a javelin thrower has is the momentum of his run which usually he is unable to transmit to his javelin. Getting into throwing position and maintaining speed at the same time is one of the most difficult things a javelin thrower has to do, and the heavier his shoes, the more difficult this job becomes. The weight of shoes varies with the size, but there are sturdy shoes available that weigh less than ten and one-half ounces each at size nine. The second thing about shoes is that the left one (if the thrower is right-handed) must have plenty of long spikes. Three heel spikes and at least five toe spikes of not less than three-fourths of an inch in length are recommended. In soft grass, even longer spikes are desirable. If the left foot slips even so much as two inches, the throw will be considerably impaired.

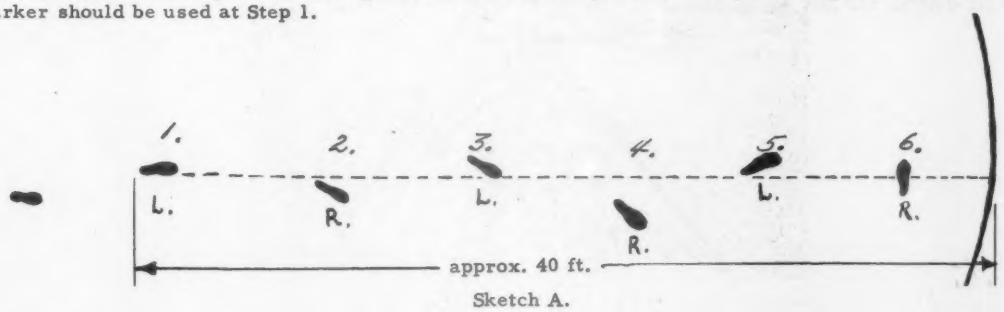
Grip

The javelin should be held so that the shaft rests in the hollow of the heel of the hand, with the second finger hooked around the end of the binding. This is the type of grip developed by Finnish throwers. This type of grip seems to give the greatest advantage in that the second finger is the strongest finger in the hand.

It is desirable to have some sticky substance to put on the fingers to prevent the javelin from slipping. It not only makes the javelin more secure in the hand, but it tends to prevent tearing of the skin of the second finger which sometimes results from hard workouts.

Steps

The last six steps a thrower takes are the most important. They are diagrammed below. A marker should be used at Step 1.



Sketch A.

Carry

The javelin should be carried over the shoulder in a horizontal position at just about ear height. The over-shoulder carry, again developed by the Finns, gives the thrower the best possible balance, and he can move into his throwing position with more speed if he carries the javelin over his shoulder.

Run

The length of the run is not of special importance, but it should be long enough to attain easily the maximum speed desired by the time the thrower reaches the check mark at Step 1. A run any longer than this is wasteful. Normally a run of one hundred to 110 feet from the foul line is sufficient for even the most skillful thrower. An early check mark, placed just a few strides from the beginning of the run is desirable.

II. THE THROW

Attaining speed

Speed should be gathered gradually so that the thrower does not waste energy in a quick start, and so that the thrower may be relaxed as he comes into throwing position. As the thrower reaches the check mark at Step 1, he should be traveling at the maximum speed he will attain during the throw. For a skillful thrower this speed will be approximately two-thirds of his maximum running speed. The beginner should not attempt to reach more than half speed. The run should not be a driving type of run with the body leaning forward, but should rather be an upright, pulling type of run, with the legs and hips well underneath the chest and shoulders (see Sketch 1).

Getting into position

As the left foot approaches Step 1, the right arm with the javelin should be dropping directly back over the right shoulder, and the shoulders should begin to face slightly toward the right.

Sketch 1

As the left foot lands in Step 1. the thrower should have his arm extended all the way back, and he should begin getting his left hip forward.

Sketch 2

In order to get the left hip forward, the thrower must drive hard off the left foot, pushing the left hip and lower left side of the back out ahead. It is important to maintain momentum while this transition is being made. It means that the hips and legs must simply move a little faster while the head and shoulders maintain the same speed, and hence the extra hard push required from the left leg. Note that while the thrower is in the air just after this push is made shoulders are already facing slightly more than 90° around from the direction in which he is moving, and his hips are facing about 60° around.

Sketch 3

As the thrower pushes off Step 2 with his right foot, his shoulders are still slightly more than 90° clockwise from the line of the throw, and his hips have turned to almost a 90° position.

Sketch 4

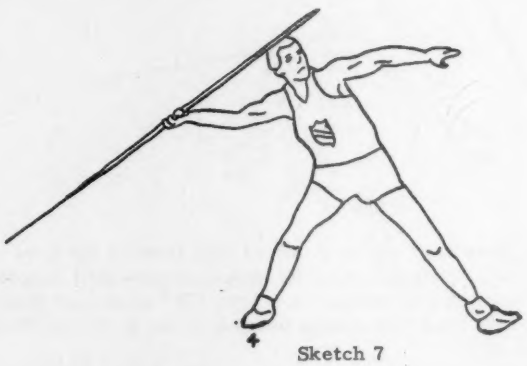
As the right foot comes out of Step 2, it actually comes heel first in the kind of motion one would make if he were stepping backwards over a low fence. The shoulders are still turned just slightly more than 90° from the line of flight, and the hips are facing more than 100° clockwise from the line of flight. In this position it is almost impossible to keep the javelin pointed in the direction of the throw, and it naturally swings around a little to the right.

Sketch 5

As the left foot leaves Step 3, the right leg comes across in from of the left leg with the heel leading. This is a very crucial position which is maintained while the thrower glides through the air for several feet The legs are actually crossed, just about as one would cross them while sitting relaxed in a chair. The shoulders are facing a little more than 100° clockwise from the line of flight. Notice how the left hip is leading with the thrower bowing over almost toward the back of the runway, and notice how far the hips are ahead of the shoulders, head, and the javelin. The center of gravity of the thrower is at this point about four feet ahead of the center of gravity of the javelin. Here is the great advantage of this style of throwing. The distance through which the throwing power can be applied to the javelin is longer than it can be in any other style of throwing.

Sketch 6

As the left foot approaches Step 5, the shoulders and the hips begin to come around, but still are facing 90° clockwise from the line of flight. Note that the right foot in Step 4 should not be pointing more that 90° clockwise from the line of flight, as it appears in the sketch below. Note also that the throwing arm is still fully extended behind the thrower. The real power of the throw begins just as the left foot lands in Step 5. The javelin must be straightened so that it is pointing in the direction of the line of flight by the time the left foot touches the ground at Step 5.

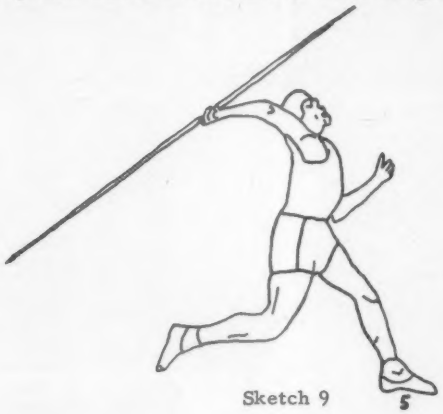


Sketch 7

The left foot must be planted firmly in Step 5 before the right foot leaves Step 4. Otherwise the kind of uplift with the body which is essential to a good throw is lost. Just as the left foot touches the ground, the thrower must drive as hard as he can off his right leg, thrusting his right hip forward and upward in the direction that the javelin is to be projected. In Sketch 8, a hard drive off the right foot is just about completed, even though it does not appear obvious from the sketch that there has been any drive at all. Even in actual observation, it is difficult to see that a hard drive off this foot is an essential part of the throw, because the drive is transmitted almost immediately to the chest and shoulders in a whip-like action. Nevertheless, in this drive, concentrating on driving his hip forward ahead of his chest and shoulder, it is essential that the thrower give everything he has. The shoulder and arm are still extended back behind the thrower as far as possible.

Sketch 8

In Sketch 9, the right foot has just left the ground, and the whip-like action has been extended into the chest and shoulders, and back through the arm to the javelin which comes almost directly over the thrower's center of gravity. At this point, maximum power is being applied to the javelin. Note how far forward the chest and shoulder come while the arm is still extended far behind the shoulder. Note that the elbow is higher than the hand, and in this position there is very little twisting strain on the elbow. The whole body is rising at this point, pivoting over the left leg which must be very strong to keep from buckling. The thrower's upward thrust causes him to leave the ground completely after he releases the javelin.



Sketch 9

In Sketch 10, the thrower is descending and is just about to catch himself with his right foot in time to prevent fouling.

Sketch 10

BUD HELD

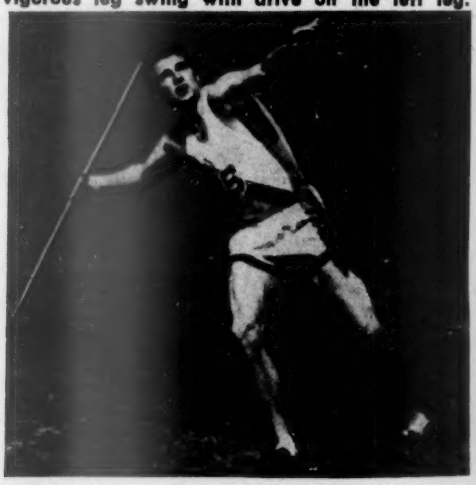
1 After approaching with long easy strides, Held starts bringing the javelin back.

2 As weight begins to shift back, right shoulder starts back but hips still face forward.

3 Note the body relaxation as the left foot descends and Held completes back swing.

4 Start of the crossover into throwing position; this is a vigorous leg swing with drive off the left leg.

5 As the rear (right) leg crosses over, the hips face forward and the right shoulder goes back and down.



6 Right foot landing. Note arm is not fully extended. Preferable to have javelin pointed in line of throw.

7 Note excellent length of stance and though the left foot hasn't yet landed, the arm has started the throw.

9 Hips snap forward, pulling the right shoulder forward. Right foot might have stayed on ground trifle longer.

11 Follow through up and over the left leg, with right leg coming forward and head now following the flight.

8 Strong muscles of the leg and torso provide initial punch, then the smaller and faster muscles take over.

10 Completion of throw at height of arm, with the wrist furnishing the final impetus along axis of javelin.

12 Completion of throw; note length of follow-through step and how it has served to "brake" the thrower

III. COMMON ERRORS

It would be very difficult to list all the errors possible in javeling throwing. Three basic ones are common to many throwers.

Slow-down

It is difficult to maintain speed after Step 1 because of the complicated movements required in getting into position. Many throwers gradually slow down during the last five or six steps. The thrower must make every effort to maintain his speed and still get into position.

Sagging hips

It is easy to let the left leg give as the hips come through on Step 5 (see Sketch 9). When this happens, the hips (and the rest of the body) do not rise with the throw, but continue on a level path. This way, valuable lift is lost.

Cocked elbow

When the thrower reaches the position in Sketch 8, he may have his elbow cocked so that the center of gravity of the javelin is perhaps only two feet behind the center of gravity of his body. This means that he loses some of the distance through which he could be applying power to the javelin. It also means that when power is applied by the shoulder, the elbow gives and absorbs the power of the shoulder, rather than transmitting it directly to the javelin.

IV. TRAINING

Off season

A javelin thrower should do some training all year. He should be concerned especially about his legs and back and shoulder.

Basketball or volleyball is very good leg exercise. Wind sprints are also good. For the arm and shoulder, it is good to have some stationary object (like the limb of a tree) about four feet off the ground which the thrower can grasp and pull on in a throwing position. This should be done by thrusting the body forward and hanging on. It should do more in the way of stretching the muscles than building them up.

Early-season

Wind sprints are good to build up speed. First throwing should be fairly easy, but the thrower should begin to throw fairly hard about once a week, as soon as he can do this without getting too many sore tendons, muscles and joints. After the first three or four weeks, the thrower's own bodily condition should determine the intensity of his training. He should throw as hard on sore muscles, tendons and joints. It is better to throw for distance twice a week than to throw for form five times a week. But one can always throw for form when he can't throw for distance.

Mid-season

Wind sprints are still good. The thrower should try to throw for distance at least three times a week. Assuming that once is during competition on Saturday, the thrower should try to throw as many as ten throws for distance on Monday and again on Wednesday. On Tuesday and Thursday the thrower should run hard through his steps, practicing getting into position with speed, pushing himself with all the speed he can handle. If he is able, he should take two or three hard throws on these days. A thorough warm-up is essential before any hard throwing is done. Friday should be a day of complete rest and relaxation, both mentally and physically, if possible.

In throwing for distance in practice, a thrower should learn to get excited just as he does during competition. If he does not learn to practice with a feeling of excitement he will not be able to use this feeling properly during the competition. If he does not practice developing excitement, he will not always be able to achieve it during competition.

BRIEF SUMMARY

The motion of throwing is a quick whiplike motion. There should never be any sense of "powering" such as one would necessarily feel in trying to throw a 6 or 8 lb. weight. The thrower should have no more sense of "powering" when throwing a javelin than he would in throwing a baseball. The secret of this is getting the strong muscles of the legs, back, and shoulder to act quickly, like the short quick motion of the base of a whip which produces a longer motion of higher velocity in the striking end of the whip. The arm is then like the striking end of a whip, not stiff, but very flexible and relaxed so as to take stress only in tension.

FLIGHT: The point of the javelin should never be higher than the line of trajectory, but should preferably be exactly in the line of trajectory (about 35° above horizontal).

The javelin should have no angular momentum about any axis not parallel to the shaft. (That is to say, the thrower should not twist the javelin so that the point goes down and the tail goes up (relatively) or so that the tail goes down and the point goes up.)

TRAINING: Throwing a javelin is the best training exercise there is for javelin throwers. A thrower should never do much easy throwing for the sake of form because easy throwing is dynamically much different from hard throwing, and can form bad habits. Easy throwing is only good for warming up, and the warmup should be thorough.

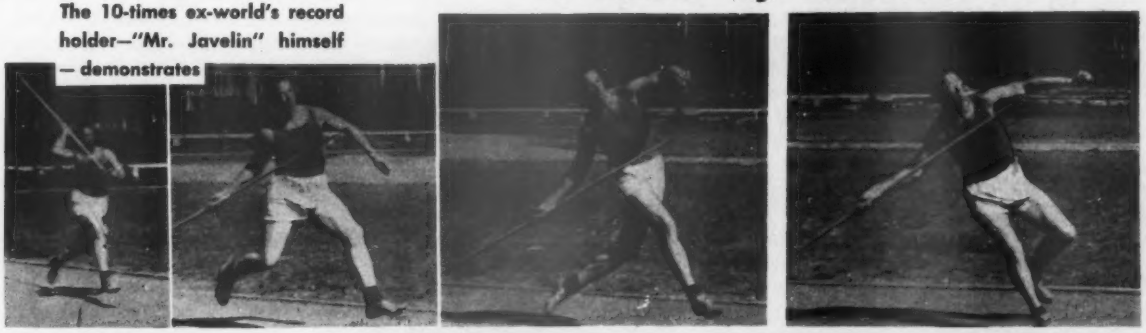
Running through the steps fast, and trying to get into position with greater speed is good training. Strong fast legs are essential. Also, stretching arm and shoulder muscles by holding onto some fixed object and thrusting hips and chest forward while arm and shoulder are stretched back in throwing position is a good exercise.

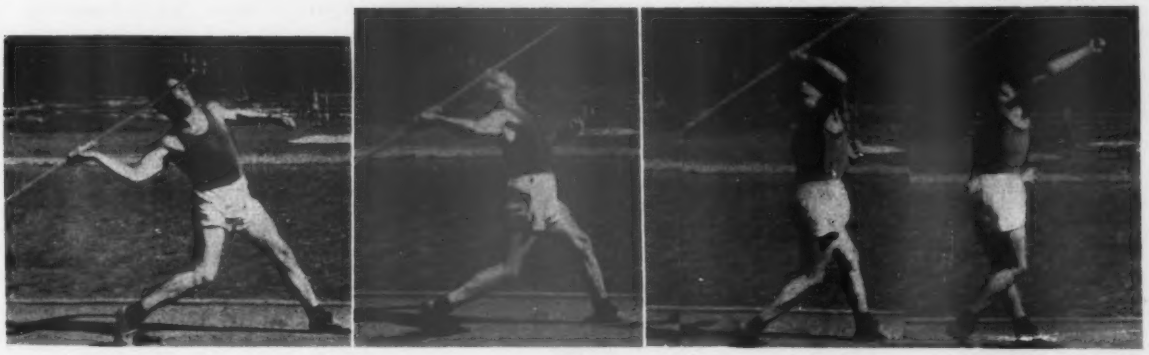
Hard, all out, distance throwing, 10 to 20 times per workout, four or five times a week is the only way to make real progress. This heavy schedule should, of course, be reached only gradually to prevent arm trouble, or other muscle or tendon trouble.

The use of a camera is very valuable. Pictures should be taken of the thrower so as to "stop" him just as the shoulder thrust begins as in the above sketch. The pictures can then be studied and compared to the sketch.

A Throw by Jarvinen

The 10-times ex-world's record holder—"Mr. Javelin" himself — demonstrates





THE JAVELIN THROW FOR BEGINNERS

By Bob Newland
Medford, Oregon

Introduction: Undoubtedly the tremendous upsurge in javelin throwing in the United States can be attributed to Bud Held and his Distance-Rated javelins and the three-way sweep of the javelin event by the United States in the last Olympics. As a nation the Finns excelled in this branch of athletics for many years and not until the 1952 Olympic Games was this domination broken. The technique that the Finns developed is now almost universal and practically all of the World ranking throwers use the Finnish technique or one of its variations. It matters not whether the beginning athlete learns a 'three step method', 'five step method' or whatever he may wish to name it, as long as the method has a uniformity, has a rhythm, establishes a simple and economical way of getting into throwing position, provides a release that will give impetus to the javelin directly in line with the javelin's angle of release both through the arm and the conversion of the momentum created by the approach run in coordination with the leg-hip-arm-release.

Any young boy attempting to learn to throw a javelin should bear in mind that there are certain elemental laws of physics and aerodynamics, basic fundamentals, and body mechanics that he must adhere to if he is to succeed in throwing the javelin any appreciable distance. A study of film loops showing Matti Jarvinen, the great Finnish thrower; Bud Held, the United States, World record holder; Cy Young, the Olympic Champion, 1952; and Bill Miller, United States, 2nd place 1952 Olympic winner all show the basic fundamental Finnish technique with each thrower also showing an individual style. I have used these film loops as part of our training program and feel beyond a doubt that they were instrumental in achieving the successes that our throwers have had. We have never attempted to style any of our throwers identically with the above mentioned. throwers; rather we have attempted to build a basic technique patterned to the individuality of the thrower.

Selection of Material: One of the problems facing the high school coach is, "How should I go about selecting a javelin thrower?" Our program here at Medford High School starts in the 4th grade. at this grade level in addition to the jumps, sprints and relay work, we have the baseball throw. It is from this that we begin selecting our potential javelin throwers. It might be well to mention here that in our program we insist on the thrower using the Finnish front cross step. Actual javelin throwing begins at an approximate age of 13 in the 7th grade. At this grade level we begin to test every boy in school for potential track ability. This testing is always done after a period of conditioning instruction in each event. At this time of development most of the throwers selected are throwing approximately 90 to 108'. One year later they are throwing from approximately 100' to 130'. In the 9th grade at the age of 15 they will average from 120' to 145' with our 9th grade record being out at 165'. Our best throwers have shown qualities of strengstrength, speed, coordination and agility. Size of the thrower hasn't seemed to be of too much importance, yet each of our top throwers had well-developed chest, shoulder and arm muscles.

Creation and Maintenance of Interest: Creating and maintaining interest in track and field is one of the most important aspects of the track and field program. At this time it might we well to thank those who have been so generous with their time in answering our correspondence. It not only has been inspirational to me but it has certainly inspired our athletes. We have Bud Held to thank for his suggestions regarding javelin training and it was through his kind of words, along with hard work, that our latest javelin thrower achieved his success. I have Gosta Holmer, Bill Bowerman and John Landy to thank for their valuable suggestions on distance training, and Fortune Gordien on the discus. I have correspondence from these fine men and others and they have proved to be invaluable in stimulating morale. We at Medford High School, are truly grateful for their time and consideration.

Beginning Javelin Throwing: In face of such distinguished company I don't feel that it is necessary to go into exact detail on the finer points of gripping the javelin, the carry, the approach run, or the release, rather I should state that we use the Finnish technique, with variations, and as in all of our track and field events, we attempt to teach the basic fundamentals, and the necessity for hard work if success is to be achieved.

In teaching the javelin we break it down into four phases: (1) Learn to hold the javelin, (2) Standing and throwing, emphasizing braking over the front leg, (3) using 3 steps and throwing and (4) using a 5 count approach.

In learning to hold the javelin we have been using both the Finnish grip and also one that we call the Boyd Brown grip. Some of you may recall that Boyd Brown was a thumbless javelin thrower from the University of Oregon and was one of the top throwers in the country in the late '30's. The loss of the thumb joint on his right hand made Boyd grip the javelin in between his first and second fingers with the thumb stub resting lightly on the binding, the javelin resting diagonally across the palm, the first and second fingers to both sides of the binding and parallel with the shaft.

After the boy has learned to hold the javelin we have him take a standing position, feet well spaced, facing at right angles to the direction of the throw, emphasizing driving off his rear leg and at the same time rotating his hips around to the front. Particular emphasis is placed on keeping the left side firm and as a brake for the whole movement. Considerable stress is put here on shooting the hip, keeping the javelin back at arm's length until the last moment, braking over the front leg which acts somewhat on the same principle as a sling and then pulling the javelin through with the elbow leading, head and eyes following the throw. Quite often the thrower will want to bend the front leg too much and reverse too fast. To assist in compensating for this error we have the boy drag the rear foot as he throws to get the feeling of staying on the ground until after the release. The beginner often has trouble aligning the javelin. In order to assist here we try to have him keep the point at approximate eye level and close to the head. All throws are made up, as in actual throwing, and not downward toward the ground.

After we have mastered this phase we turn to using the last three steps of our count and throwing, emphasizing the fundamentals we learned from the standing position. We start this movement standing with the feet parallel, dropping the javelin and stepping into throwing position.

In the final phase of our training we learn a five count step. First, the boy walks through it, jogs it, then runs through it. All of our throwers start their approach work with a minimum run of 90', in the last 30 feet of which they execute the 5-count approach. As to the speed of the run we try to emphasize smoothness and rhythm, and running at a speed that the boy can handle in transferring the forward run to the flight of the shaft. As described by Bill Miller, "Speed at the throw is everything; speed in the approach can be nothing!!!"

The 3 basic problems in developing young javelin throwers seems to be (1) Converting the approach run into useful momentum, (2) Braking over a firm left side, and (3) Delaying the arm action as long as possible, with the arm being fully extended to the rear until the last possible moment.

Training: We constantly emphasize to our throwers the necessity for an adequate warm-up before hard throwing. This will usually include a lap, exercise and standing and throwing easily until they feel ready for hard throwing. Two or three runs for checkmark adjustment then hard throwing 15-20 trials. We feel that the action necessary to throw a javelin only comes with throwing at full effort and not at 1/2 - 3/4 or form speed. The intensity of the throwing increases as the season goes on and the thrower is built up to hard throwing. Constant emphasis is placed on running through steps fast, and trying to get into position with greater speed. The use of a camera is very valuable. We take pictures of all our throwers and when showing them, often show them simultaneously on the screen with one of the champions, for comparison, style and technique. Considerable time is also spent in studying film loops on the champions in action.

THROWING THE JAVELIN CANTELLO STYLE

By Frank Wetzler
La Salle College (Philadelphia)

When I first received the letter asking me to be one of the speakers at this clinic, I was amazed and naturally elated. After all I'm just "another coach" - and that is the class that most of us fall into, a class that tries to do a reasonably good job with the available material, if I may call young men "available material". I, like many other coaches, have neither a national nor an international reputation. My first though was: "What can I contribute that would help someone else? How am I best able to demonstrate what can be accomplished with imagination, logic and sheer hard work?" I am no different than other coaches. Sooner or later all of us are face to face with a particular problem and we have to solve it. The manner in which I solved mine is probably the reason why I am here.

It would be presumptuous of me to tell you that the way I solved it was the only way. Perhaps some other coach would have done a far better job than I. I'll never know. However, I do know that a lot of sweat and effort was involved in arriving at what I though was a reasonably good solution.

The problem in my case was the javelin.....or rather the technique of throwing the javelin. We were fortunate that a young man, who had thrown the javelin in high school, came to La Salle College. He had thrown 185'--once! He had been out of school two years and during that time had seldom thrown the javelin. I had seen him throw in one of the summer meets and he didn't do too well. Although he had had a good coach in high school, he, like many a young athlete, acquired as many coaches as meets in which he competed. The result was a mixture of many techniques and styles. When I next saw him in September, he was a student at the college. I had the opportunity of speaking with him. His eagerness, intensity, curiosity and impatience impressed me. Thus when he reported for track (and very late since he was an excellent diver), I had already decided that to work with him was worth the "long haul" rather than sacrifice him for immediate success - such as it might be.

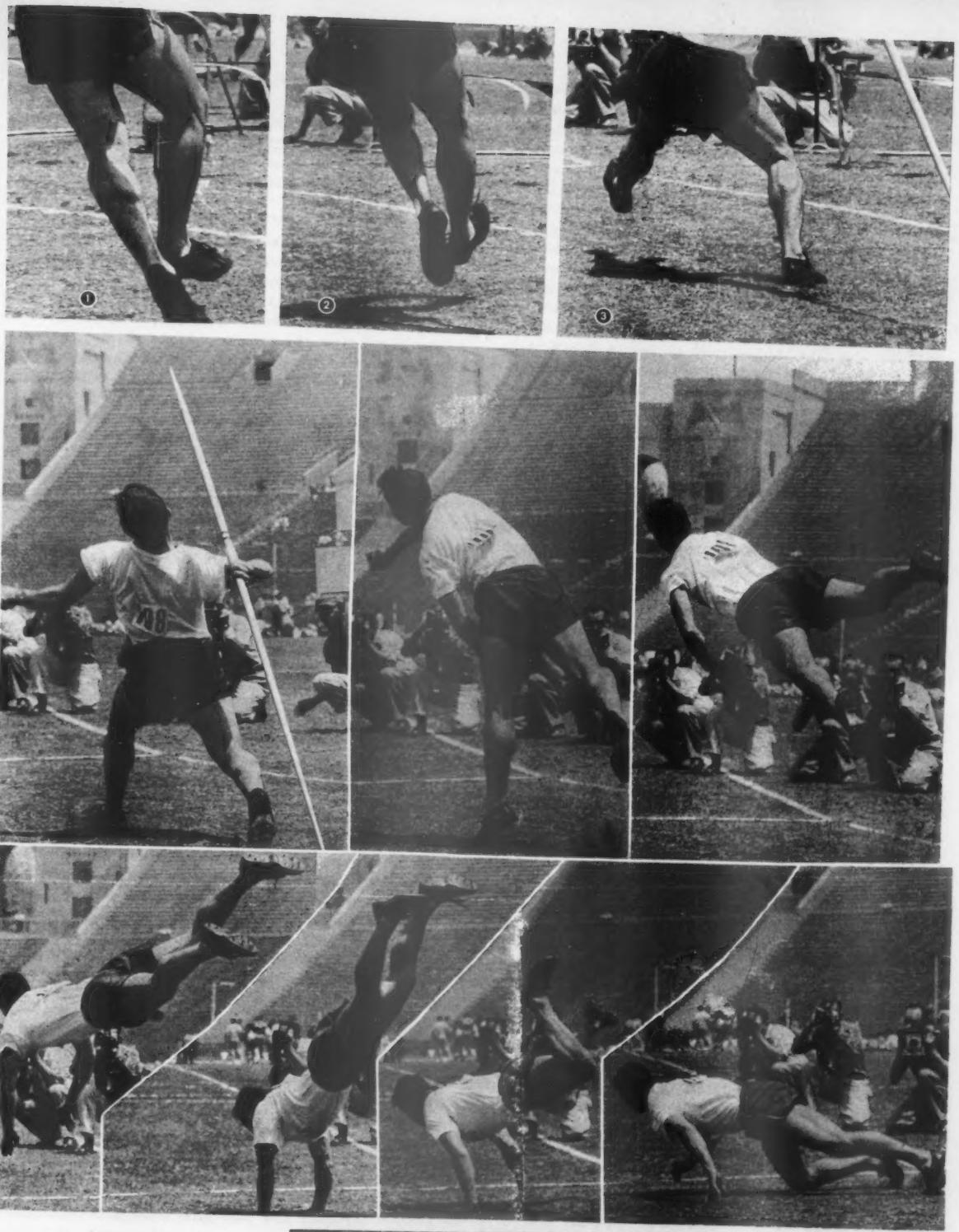
The "long haul", as I call it, meant that I had to learn as much about throwing the javelin as was possible. It also meant that it was going to be a "cross over" and not the "American hop"....which, in my opinion, would have given us better immediate results. Meanwhile, I had read as much about throwing the javelin as I could. I quickly discovered that reading about throwing the javelin and then trying to put it into effect are two quite different things! Al and I decided that I would try to think the entire process through and he would carry it out. I was going to think it through! I, who had never seen a really great, or for that matter, an excellent javelin thrower! In the final analysis, I think that helped me. You may think that a strange statement to make. I don't believe it is. Most coaches, I think, have a mental picture, a COMPOSITE IDEAL, as I call it, of each event. With the "composite ideal" to fall back on, they superimpose the athlete onto the ideal and make him conform to the pattern. I didn't have that "composite ideal". I had to work the other way around. I worked with the athlete and tried to work out what was best suited to his particular talents. Hence - "Throwing the Javelin -- Cantello Style."

Knowing the difficulties I had in trying to make action suit word, I can perhaps best demonstrate what happened by showing you a film which I made. The film will show you step by step how Al and I solved the problem of throwing the javelin.

Thus with a great deal of reluctance do I put the following words on paper. The words are only a guide to the film - so that you have some idea of what will be shown next. I'm a firm believer in "one picture is worth a thousand words".

Considerable footage is devoted to the GRIP. The reason for this is -- if you don't know how to hold the javelin, why continue with the other phases of learning?

The grip is the standard grip - also called the "Finnish grip". The middle finger is the one that is carefully wrapped around the javelin - just behind the cord. The reasons are obvious: the middle finger is the strongest finger and that part of the hand to which it is attached is the strongest part of the hand; the placing of the finger behind the cord allows for a better grip, prevents slipping and gives surface resistance. The index finger is placed along the shaft - much as you would hold a pen or pencil when writing. This enables the thrower to better balance the javelin, gives him better control. The other two fingers fall into place around the whipcord. The shaft of the javelin lies in the palm of the hand, just slightly raised from the heel of the hand. The thumb is placed parallel to the javelin just behind the cord. It falls,



AL CANTELLO—

more or less, into a natural position, again aiding in balancing and controlling the javelin.

The same sequence also shows the basic principles of throwing the javelin. The arm is extended to the rear, relaxed with no tension. The arm is brought forward with the elbow out front, much like the action employed by present day "forward passers" in football. The arm action is straight ahead and close to the head. The arc of the arm is high and the final movement is a "flip of the wrist". The entire action is a pull rather than a throw.

The right leg is bent.....all weight rests on it. The right foot is placed parallel to an imaginary throwing line. It forms a right angle with the left foot which points directly ahead. The position of the left leg is one of comfort, not too wide a stance, but one that will make the athlete feel at ease.

As the throwing arm reaches its highest arc, the chest is "squared away", that is, it is parallel with the foul line. Maximum power is thus attained. At the same time the hips come into play. The action resembles somewhat the action of a "burlesque dancer"....when she is about to go into her routine of "bumps and grinds".....again giving the thrower added impetus and power.

The important thing is that all of these actions are interrelated and have to be learned as part of an integral whole. Each is worthless in itself - unless properly coordinated with the entire action.

Shown next on the film are exercises which I call "spot throwing". The purpose of these exercises is to develop the throwing muscles slowly and without undue strain or pressure. It also enables the thrower to gradually learn how to control the javelin, get the feel of it and also how to balance it - to make it an essential part of his throwing arm. At the same time he puts into practice the fundamentals so far described.

"Spot throwing", in the beginning, is always done into one of the pits--broad jump, pole vault, or high jump. It saves a lot of wear and tear on the javelins. Also, the thrower always aims at a target. It is not aimless or haphazard throwing. The emphasis is on control---and the boys become pretty adept at hitting the target.

The next step is that of the "last five steps" or "final steps". The count we used was: one, two, cross, throw and reverse. The count can be made any number of other ways. I don't think it matters much how the count is made just as long as it is made - especially while learning - and it should be continued even after the thrower has become proficient. Each count, whether number, word or phrase, recalls to the thrower a certain action which he then consciously or subconsciously tries to put into effect. If he has built up a series of good habits, the effort will be a subconscious one....meaning that he can devote all his thinking and physical effort toward only one thing or phase--the release or explosion, or any other name that you might want to give it.

The final steps, the way I see it, are one of the most important phases of throwing the javelin. Great care, much effort and lots of work should go into perfecting each detail of each of the steps. In the beginning any line can be used as the start of the steps. The athlete will jog to the line and make certain that he hits it with his left foot. That's the start. He now begins his count. The landing of the right foot completes the count of one. Meanwhile, he has dropped the javelin into such a position that the point is close to his face and the tail is just off the ground. Chest and javelin are almost parallel. The throwing arm is in the position which was described earlier. It extends back, relaxed - with no tension. The footwork is important. The toes of both feet point directly ahead. On the second count, the left foot hits the ground. This time chest and javelin are parallel. The left toes are now pointing slightly to the right.... not accentuated - just a slight turning in. On the third count, the thrower gets into position to make the "cross over".....actually not a cross over at all but just giving the right leg a high lift and placing the right foot at right angles with the left foot. The right shoulder is dropped. This is done by raising the left arm and shoulder. This is a natural action and most boys do not have any difficulty in mastering it. The throwing arm is now extended as far back as it can go - with no tension. All the weight is on the right foot. The angle of the body is to the rear. The lean is as great as the athlete can master.....the greater the lean, the more power he will eventually have.

On the count of four he throws the javelin. The javelin thrower now has many things to do and he has to do them quickly. If he hasn't mastered all the fundamentals, he will have to think about the mechanics. This is no stage of the throw to be thinking about the mechanics. Here all his efforts - mental as well as physical - should be directed toward only one phase, the explosion or release! The power comes from his right leg which is bent. As the javelin reaches the release point, the power has been transferred along the leg to the hips, up the back, the shoulders and arm. Because it is a pull and not a throw, the left side comes into considerable play. This pulling action again adds power to the throw. At the split

second when the power is at the maximum point, the release is about to take place, that's the spot when the left foot comes into play. At that precise moment, the left leg hits the ground and additional power is obtained from it. That is what I mean when I say "throwing from the left leg".... a phrase often heard. It is at this point where most javelin throwers shift the weight too quickly onto the left foot or leg causing a forward lean and the loss of power. It usually results in a mediocre throw - unless the man has especially good reflexes and manages to salvage part of the throw. Try it yourself. If you do it without movement..... then it can be done. However, if you add a little momentum to it.... then see how it works. If you keep your left foot solidly planted to the ground, I don't see how you can get maximum power and follow through. This shifting of the weight onto the left leg usually results in excessive lean to the left and in a throw it means that the arm precedes the elbow.

All the momentum that has been gained from the run now has to be "braked". This is done with the left foot and leg. All the power is directed upward and forward by means of the follow through.

The count of five or reverse is nothing more than extending the right leg to stop further forward momentum. In our case this was not possible because Al's power was so great and his follow through so vicious that he couldn't bring his leg (right) forward fast enough to check himself, and when he did, the leg couldn't hold him. This led to his particular style of finish.... a tremendous drive and dive with a powerful follow through.

On the film you will see demonstrated the last five steps. You wil also see the "cross over in action". Cantello practiced the cross over more faithfully than any other javelin thrower I know of. Part of his daily workout consisted of nothing else but running the length of the football field - doing nothing else but the cross over. He did this several times during an afternoon's practice. This mastering of the cross over was the key to his success as a javelin thrower. It became part of him. He never had to think of the cross over as such.

Al Cantello's best throw in 1955 was 245'3-1/2" (75.47 meters). His best throw to date - June 4, 1956 - is 246'7" (75.82 meters). This, of course, is a great deal better than his first throw in college competition, which took place in a practice meet with the University of Pennsylvania during the month of April 1952. His throw then was 172'9-1/2".

The Carry.

The carry is a matter of choice. It should be the one which is most comfortable for the thrower. The carry Cantello used and still uses is a front carry with the point down.

The Approach

The manner in which we worked out the number of steps was rather simple but it required a great deal of running on Al's part. It required the help of several young men. Each had a specific step to note. Al started his run on any part of the field and the number of steps was counted - including the last five. After doing this a great number of times, we finally came up with the right answer. We measured the last five steps, and the distance of the steps needed to work up his momentum and then transferred them to the javelin arc. The steps require constant checking and rechecking. Part of his daily workout was just that.. the approach. If the turf was fast, then the steps had to be lengthened; if slow, they were made shorter. The same thing held true if the wind was at his back or if he was throwing into the wind. Nothing was left to chance. It was worked out. We used Marker No. 1 as the start of his run. Marker No. 2 was the spot on which the left foot hit for the start of the last steps. The final marker was the foul line.

The idea of the approach is to build up as much momentum as possible and then use it to the best advantage. You no doubt have often seen men run as fast as they can and just before they throw - they stop! They could have saved themselves the running effort and just taken a few steps and the throw would probably have gone just as far. The slogan is: "Build up the momentum but don't lose it! Use it!" That's what we tried to do. The faster the run, the greater the momentum. The approach has to be fast or as fast as the thrower can handle. If he can't handle it at once, work him into it gradually. Eventually he has to go faster. The approach has to be smooth. There can be no jerky movements. If there are, balance, coordination and timing will be lost. Throwing the javelin is a "skill event" and even through parts are learned separately, they cannot be put into use separately. They have to follow one another smoothly and have to be well executed. Rhythm is essential.

On the film you'll notice the smooth approach, the precision with which each step is executed.... and also the rhythm and grace. The last five steps are steps which have to have a certain amount of "bounce". The thrower has to be light on his feet. He cannot "plant" each foot solidly. If he does, he

has difficulty in carrying his momentum all the way. The steps are firm but each step gives additional "bounce" to the other. This is essential. You've lost all your momentum once you are planted "flat footed", footed".

The other idea we worked on was - no distracting movements. By that I mean, no twisting and turning of the body and feet. Every effort was made to have every movement point toward the foul line. That was the spot that we wanted Al to get to - as quickly as possible and with as much power generated that he could adequately handle. By adequate I mean extremely well.

One other phase of the approach is getting the javelin into the right position and being ready with it when in position to make the throw. What we did was anticipate step number 1 (one) and drop the javelin a step or two in front of the first of the last five steps. This had an advantage over the other method because if the thrower approaches with a rush, he will not be able to get the javelin back where it belongs and have it ready for the throw. This again is a matter of individual choice and requires work to determine which spot is the correct one on which to get ready. Remember - even men with quick reflexes need time to get ready when coming with a rush.

There is still another phase, which I mentioned previously, and to which I would like to add a few words. It is the pull. If you watch the pictures carefully, you will note how Cantello "pulls the javelin through the middle". This pulling of the javelin through the middle is one of his greatest assets. He probably does this as well as any javelin thrower in competition today. You'll notice how he moves his head slightly to the left to let the javelin pass. If you look closely, you'll see the tail of the javelin just to the left of his right heel. From this pull he gets additional power. Often you'll see javelin throwers (excellent men) let their right arm get away from their body. It is a complete sidearm motion. You'll see what I mean when you look at two shots of Bud Held, the world's record holder. It only proves "one man's meat is another man's poison."

I would like to make one additional observation. I think it is important that the coach "develop a feel" for the event. Whatever the athlete does, he does with him. He goes through every motion, step and gesture....not physically but mentally. In that way, he becomes part of the athlete and is better able to understand the difficulties which the athlete has in learning a certain phase of an event. The coach, along with the athlete, develops a sense of poise, balance. The coach and athlete are just part of an entire whole. The efforts of both will show in the final results. There is only one answer to any event....learn it, study it, work at it, and hope to God that some young man, endowed with some particular talent, will come along and will be just as interested as you are, have the same desire for perfection and is a tireless worker.... and then you cross your fingers and hope for the best!

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As the film is being shown I will make comments on the various phases of throwing the Javelin. Some are in the paper, others are not. There is some repetition of several sequences. The most important of these is when Cantello, wearing a blue jersey, switches to wearing a white jersey. It is much like a "before and after sequence".

You'll also see shots of some of the greatest javelin throwers in the world. No man can have them all. I'm fortunate to have a few. They will be seen in the following order:

Rautavaara
Hyytiainen
Berglund
Held
Cantello
Miller
Young
Cibulenko
Sidlo
Kuznecov

COMPARISON OF THE STYLES OF CHAMPION EUROPEAN AND AMERICAN JAVELIN THROWERS

By Kalevi Rompotti
Finland

Finland has held leadership in javelin throwing since the 1912 Stockholm Olympic Games and up until recent years; but now both America and some European countries have developed many splendid javelin throwers too. Like all sports, javelin throwing has developed much during the last two decades. Nowadays we use a different kind of measurement of results than earlier, and we now use a little different javelin, developed by world record holder Bud Held. But has the throwing technique developed equally? My comparison of the "old" Finnish javelin style with the technique used by the world's best javelin throwers, such as Held, Sidlo and Young, has tried to throw some light on this question.

Rather than try to analyze all the small details, I have tried to concentrate only on the most decisive throwing strides, III and IV, and observe especially the work of the legs and trunk during those steps. My presentation is based on a slow-motion movie analysis of the throwing technique of Held, Young, Sidlo, Zatapkova, and the Finnish throwers Nikkanen, Jarvinen and Rautavaara, the most important creators of the so-called Finnish javelin technique.

When we observe the technique of Finnish throwers (all of whom are throwing basically the same way) and the other best throwers of the world, we find many similarities but some differences too. The carrying of the javelin, the grip of it, the five steps from the step mark to the throwing line and most of all the lowering of the javelin during the first two throwing steps too are nowadays approximately uniform among all throwers, but in the decisive activity in steps III and IV we can find some essential differences.

It seems to me that Bud Held has had a notable influence on recent throwing techniques. It is interesting to find, for instance, that Janus Sidlo, one of the best European javelin throwers right now, whose best result is 80. 15 m (over 262 ft.) has in his technique clear influences of Held's throwing. Here in the U. S. A. for instance, Miller, Cantello and may others have in their technique the same characteristics. At Stanford I have found how Leo Long, one of the best American throwers, who has already thrown over 75 m (over 245 ft.) and Bugge, who this spring has won against both Young and Held with his throw of over 73 m (over 239 ft), as well as some other young throwers, are trying to follow the Held style, which we soon could call the American style which is characterized by a relatively short and low III cross step with trunk turned to the right and deeply bent at the hips. Right in the III step I see the biggest essential difference between the Finnish and the Held style, which seems to be spreading more and more. In Held's style, in the second throwing step the left leg steps on the ground with the toes clearly pointed more inward, so that the foot makes a greater angle with the throwing line, due to turning the hips to the right. It is harder then to push strongly with the left leg to the third throwing step, as is done in the Finnish style. The push of the left leg to the III throwing step is rendered in the Finnish style with a high and strong forward push of the right knee, with the effect that the right hip stays continuously in a line about at right angles to the direction of throw. The upper body, however, is turned to the right so much that the shoulder line is parallel with the throwing line. In order to get the right rhythm and to get the right knee better forward, the right knee already in the first throwing step is many times pushed more up and forward. The upper body turn to the right is helped with the left arm pushing it backward. So at that phase when the right leg is coming to the earth for the third throwing step, in the Finnish style, the hip and shoulder lines are perpendicular to each other, while in the Held style they are in the same line.

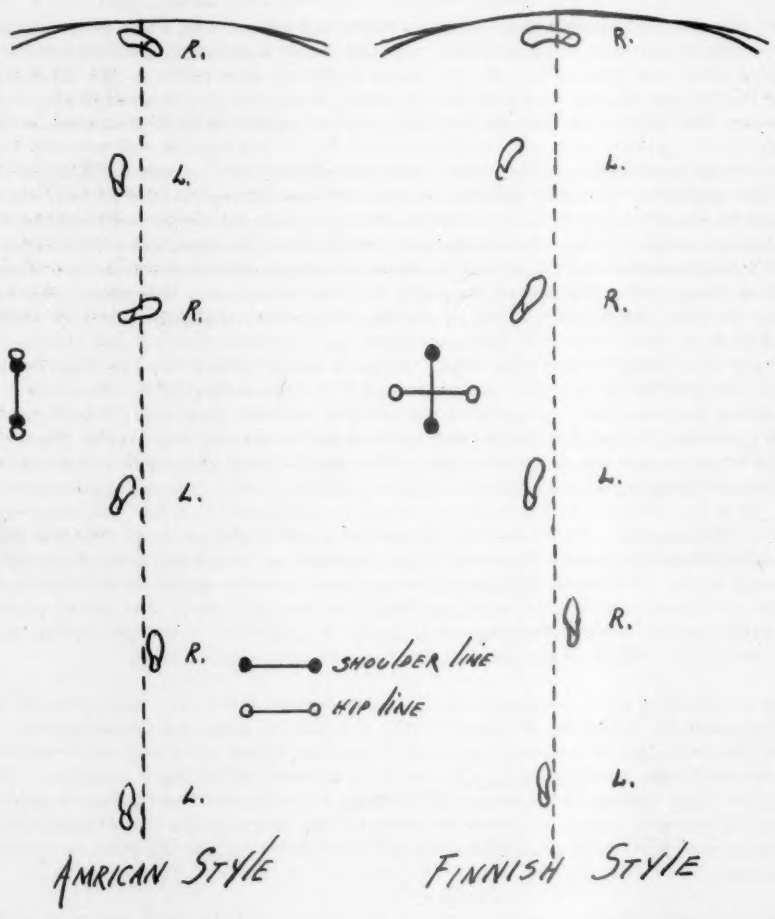
Because of the very strong hip turn to the right in the Held style, the buttocks and back may even be slightly turned toward the direction of throw. This position is deep and advantageous, because the javelin is very low and far back, but this strong hip turn slows the speed down and the cross-wise position of the javelin behind the back can easily lead to a throw wide outside of the right shoulder. The hip turn has the effect too, that the right foot comes down much outside and then the knee points outside (to the right) too. In the Finnish style the foot comes down more forward and more in the throwing direction and when the toes and knee point more forward it is easier to get an effective right leg push to the highly important fourth throwing step.

In the Finnish style, before the final throw the javelin is held down and back with a strong body lean, so that in both styles the throw starts equally far and down from the back.

Because in the Held style the hip is back before throwing, it is very important in that style to emphasize the fast hip movement forward. Because the hip, in the Finnish style, stays more in front, and the direction of the foot and knee of the right leg makes it easier to get the hip forward rapidly, it is possible to concentrate on the movements of the chest and upper trunk (shoulders), which I feel are still more important than the movements of the hip in that very last phase.

Just before the final throwing, the chest and shoulders must move as far forward as possible, (when the hips stay back). In this way we can better get the body weight upon the left leg which is necessary for getting the so important lift of the javelin. This very rough forward fling of the chest is seen to be extremely effective in the throws of Sidlo, which shows that although the III step of the Held style seems to be less advantageous than the corresponding III step of the Finnish style, it is possible in that style too, to work effectively in the decisive last fourth step. This results from the fact that in the Held style there is more emphasis than in the Finnish style on putting the left foot straight forward in the fourth step, which helps to get the right hip forward rapidly.

So it seems to me that by joining the placement of the left foot in the fourth step of the Held style, with the third step of the Finnish style, still better results could be obtained.



DON CANHAM

THE DISCUS THROW

By Jess Mortensen
University of Southern California

There are basically two different forms used in the discus at this time. There is the form used by the tall, long-armed slow man, who has to depend on a long pull rather than speed and explosive power. The second form is used by the shorter, fast man, who depends on speed in the circle with leg lift and explosive power.

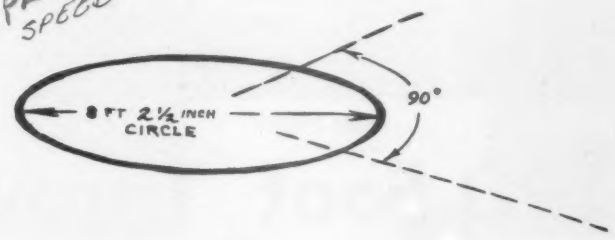
It is rather difficult to explain the difference between these two forms without illustrations or motion pictures. Slow motion pictures were shown at the clinic, of Iness, Des Koch, Parry O'Brien and Rink Babka, to show the difference between the two types of throwers.

The basic difference between the old orthodox turn in the ring used up until about 1937, and that used now is this: in the old form, the athlete's left side is faced toward the direction of throw with the right foot at the back of the circle, and the left foot in an imaginary line across the circle. In the new form, the thrower has his back toward the direction of throw with both feet at the back of the circle. It is easy to see that this will give the thrower a full eight feet to make the turn, since he is pivoting on his left foot. This, of course, is a great help, especially to the tall, long-legged man. Also, it gives him another quarter of a turn to develop more speed.

An attempt will be made here to describe just what the movements were on the throw that Sim Iness made when he broke the world record in the 1953 N. C. A. A. meet in Lincoln, Nebraska. Iness has his right toe at the rear of the circle and his left toe about three inches from rear of the circle. The feet are placed two feet apart; as he swings the discus back, his weight shifts to his right foot. He forces his right arm back just as far as possible and still keeps it relaxed. As he starts the turn, his weight shifts to his left foot with the knees slightly flexed. His right arm is forced back throughout the turn with the left arm cocked across his chest. From this position, Sim starts the spin on the ball of his left foot, throwing his right leg around his left with the knee well bent. He pushes off with his left leg using a tremendous thrust to gain more momentum. His right foot lands about in the center of the circle with the left landing just slightly to the left of the line of flight of the discus. This open stance prevents locking of the hips. He is now starting the long pull. His left arm is starting to pull and his hips are starting to turn in advance of his right arm. In this actual throwing position, his left leg is almost straight, and his right leg is well bent, with the weight over the right leg. His arm is still held as far back as possible. Sim will now start to extend his right leg for the push-off and his left arm will be thrown to the left. His chest has started to be thrust out and his head is thrown up and to the left. The discus will drop only very little below the level of the hips as he comes around for the final release. The right hip leads the arm, but when the throw is completed, the force of the throw will bring the right foot around so that both feet are near the front of the circle.

The training for a man working for perfection should include lots of running and sprint work; also, a well-directed program of weight lifting.

Stride, proper use of ABS
Full extension
momentum
PUSH off
SPEED



SIM INESS

First 190 Foot Throw

FORTUNE GORDIEN

ADOLFO CONSOLINI, Italy: Best Throw—186'11¼"

Commentary by Frank Ryan

At age 39, the 1948 Olympic champion shows no sign of decay. In fact, 1955 was his greatest season ever! He competed in 29 meets, lost only once, and unfurled the third longest throw in history—186'11¼".

NO. 1: Back to direction of throw—body relaxed, weight over left foot.

NOS. 2-3: Discus swept naturally (not rushed) as far to right as possible. Body weight shifts over right foot. Shoulders, right arm, and trunk rotate freely to right.

NOS. 3-4: Start of turn: Body weight shifts back to left. Left knee bends to help generate momentum to carry thrower over to and around left leg into initial spin. *Slight* bend forward from waist. Head slightly to left (but not too far).

NOS. 4-5: Spin way *around* left foot; left knee bends a little more.

NO. 5: Weight seems to concentrate over left foot for an instant. Eyes facing direction of throw. As momentum starts to carry you forward, in direction of the throw, spring forward (not up) quickly from left foot in direction of throw.

NOS. 5-8: Both feet off ground. Important to get both back on ground as quickly as possible. Can exert no force on discus with both feet off the ground.

NO. 8: Right foot lands. Right knee *already bent.* When right foot lands, don't bend right knee further. It merely wastes time at moment you need maximum speed. When right foot lands, toe should be pointing directly back, opposite to direction of throw. Left foot must land as soon after right as possible. When left foot lands, *head and shoulders must still be facing directly to rear,* much more so than shown in this picture. *Throwers must practice hitting this position again and again.*

NOS. 8-9: Let body momentum carry body weight *onto* bent left leg while discus is still as far back as possible. Head facing forward in No. 9, not to left.

NOS. 9-10: Entire body whips discus through long finish position. Arm acts as whip, not main pulling force. Left leg (not right) activates entire lift and straightens only when body weight is over it.

NO. 11: Reverse starts here. Its purpose is to check forward momentum to prevent fouling. Important to check momentum only after it has been used to whip the discus. Therefore, do not reverse until discus has been released.

CONNOLLY'S HAMMER THROWING STYLE

By W. P. Gilligan
Boston College

Beginning Steps in Hammer Throwing

Probably the best approach to teaching the hammer throw is to begin with footwork. The most effective method of footwork is known as the heel and toe turn. Here the thrower works his way across the circle by pivoting alternately on the heel and ball of his left foot. The left foot remains in contact with the ground at all times.

If you are able to teach the heel and toe turn to the beginner before he attempts to throw the hammer you can minimize many of the problems of balance which plague the learner.

Turns with a Baseball Bat

Put a baseball bat in the hands of the new boy and teach him the heel and toe turns. Have him sweep the bat around at arm's length as he practices the turns. Do not have him wind the bat around his head. The preliminary swings will come a little later.

As in any action where the body applies force the body weight is shifted in hammer throwing. As the bat sweeps, the body weight shifts from the right to the left side and centers itself over the left heel. The body then continues turning and the boy pivots on the heel of the left foot and the toe of the right to a point just short of 180 degrees (or half a turn) from where he started. By the time he reaches this position the body weight and balance have shifted from the heel of the left foot to the ball of the left foot. This enables the boy to stay in contact with the ground and complete his turns.

The right foot maintains contact with the ground until balance is reached on the forward part of the left foot. The right foot is brought around the left leg low, closely and quickly. It is actually snapped around. If it is allowed to lift too high or too wide it takes too long for the right foot to get back on the ground again and the hammer has swept past the low point. The right toes push off the ground as the foot starts around the left. Most hammer throwers don't push but let this right foot come off the ground by itself. When the boy is able to sweep the bat through 8 or 9 good turns, he is then ready for the next step.

Turns with a Short Hammer

This step is very similar to the first except an abbreviated hammer is used in place of the bat. This hammer should have a small length of wire so the overall length does not exceed three feet. Again without preliminary swings the boy goes through his 8 or 9 turns. It is now necessary to teach the proper hand grip and be sure his hammer stance is correct.

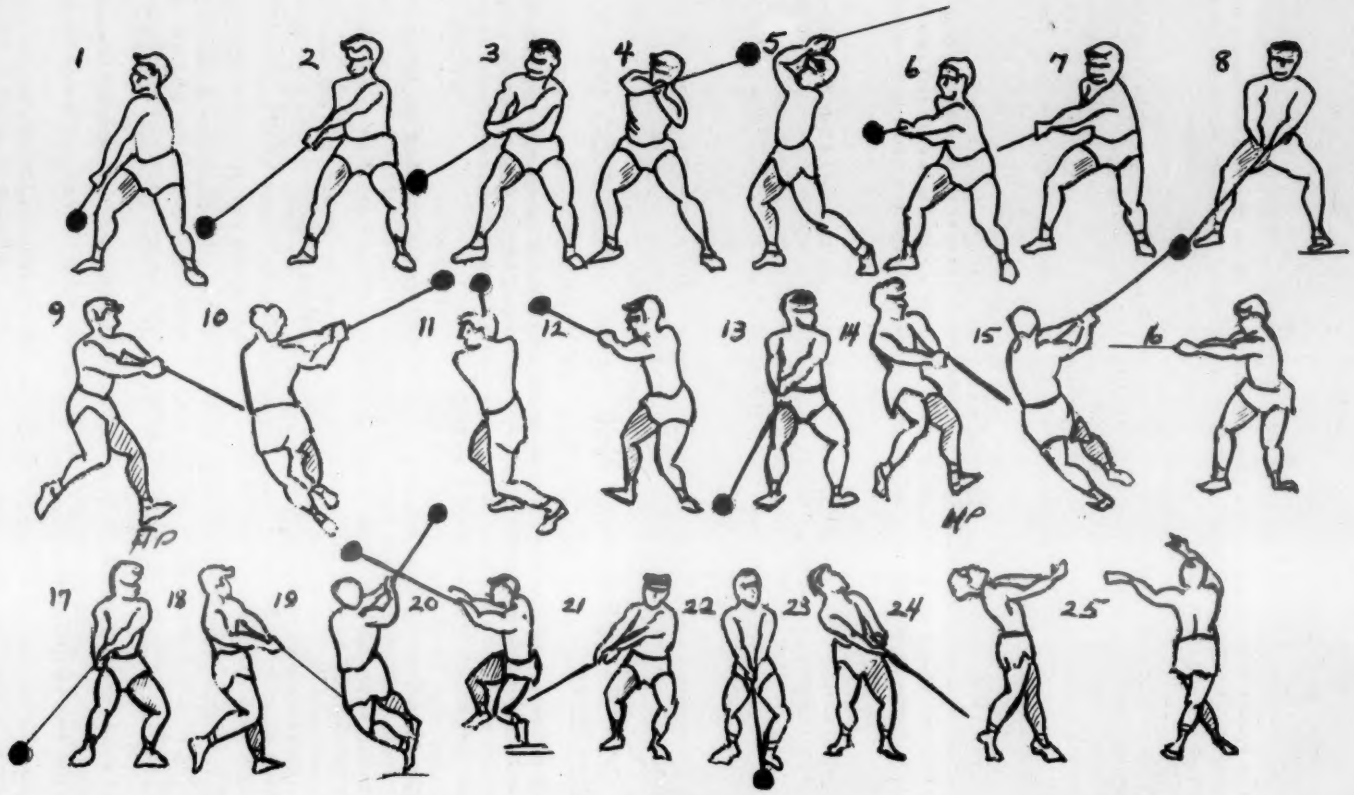
Hand Grip - In order to get the maximum length between the body and the hammer head the hammer handle should be held down between the first and second finger joints of the left hand. The back of the left hand and the large knuckles should be flat. The fingers of the right hand cover the fingers of the left hand on the hammer handle.

Stance - To assume the correct hammer stance he sets his feet, at the back edge of the circle, slightly wider than shoulder width apart, toes turned out slightly, knees bent, head erect, back straight and body twisted around 90 degrees to the right. The left arm and hand are reaching directly toward the front of the circle for the hammer. A normal length hammer would be lying directly behind the thrower's right leg.

When the boy can do 8 or 9 good turns with the short hammer he is then ready for the preliminary swings.

Preliminary Swings with a Short Hammer --Check diagram sheet "Airplane View of Preliminary Swing"

In this step the boy learns to execute the preliminary swings around the head. These are used to build hammer speed prior to the start of the turns. This hammer acceleration which has been built up may then be put to use as one of the counteracting forces throughout the turns.



HAL CONNOLLY

To facilitate learning the hammer wire is shorted about four inches. This makes the low point less of a problem. The boy learns to keep his left arm straight as the hammer sweeps through the low point.

When the new boy attempts these preliminary swings he may pull himself off balance. This is due to the fact that he has not learned to compensate for the pull of the weight against the body. When this compensating lean or pull of the body against the weight is mastered, it not only helps maintain balance but it is used to help build centrifugal force in the hammer.

The preliminary swing, or wind, is started in the following manner. Take a position at the back of the circle with the back of the boy facing the direction of the throw. Feet should be placed slightly more than shoulder width apart, with toes pointing out. As in the stance, the knees should be bent, the head erect, and the back straight. The hammer head is placed toward the front of the circle behind the thrower's right leg. It is placed this way so the thrower will have to twist his body a full 90 degrees to the right to pick up the hammer. As the left arm reaches around to the right to start the swing, there is torque or pressure from the left shoulder straight through the arm from the very beginning. This insures effective power from the start of the preliminary winds. On each successive swing or wind it is necessary to assume this position of twisting to the right in order to keep the hammer on the right side and keep the low point where it belongs.

As the hammer thrower picks up the hammer on the extreme right he begins to "power it" as soon as the right foot hits the ground and the left arm straightens out. With legs bent and body leaning to the left, he leans back slightly and develops more pull in the torque line from his left shoulder to the ball, till the hammer reaches a point in its orbit a few degrees short of dead center, or directly in front of the man's body.

Both elbows are now bent and the hands are brough directly up towards the face. As the hands near the forehead or hairline, the body twists quickly to the extreme right for an early pick-up to start the next "power arc". The hands continue back over the head in what appears to be a straight line from the time the elbows began to bend at the end of the "power arc" to the point of pick-up for the next preliminary swing.

When he can twist back quickly to the right and pick-up the hammer early with a straight left arm, he is then ready for the turns with a regulation hammer.

Turns with a Regulation Length Hammer

This is the stage of hammer throwing when the coach has to be a disciplinarian. It is here that thoughts of throwing for distance must be eliminated. We are now using a full length hammer wire, and using the same procedure of having the boy go through 8 or 9 good turns.

In order to keep his turns good the boy must remember to keep his preliminary swings as far to the right as possible. This keeps the low point where it belongs which in turn determines the extent of the "power arc". As this term has been used before but not defined it might be well to describe it here.

Power Arc. The power arc begins at that point in the orbit where the thrower's right foot has landed and the left arm straightens out. There is now a straight line from the man's left shoulder right to the middle of the hammer head. This power arc extends along the orbit to that point just short of dead center on his body where the man begins to move his feet for his turn. On the preliminary winds the power arc ends where he bends his elbows to bring his hands up over his head. The power is derived from the body sway and the lateral drive from bent legs.

Low Point. As the position of the low point is so vital to good hammer throwing it might be well at this point to mention a little more about it. As the left arm straightens out after the pick-up on the extreme right the hammer is swept towards the ground. That place in the orbit in which the hammer comes closest to the ground is known as the low point. It is here that problems of faulty balance, lifting with the arms, dropping the head, bending forward etc. will exhibit themselves by causing the hammer to hit the ground.

Execution of Turns

As the fundamentals of footwork have been mentioned before, the comments in this section will be concerned with the problems of balance with a speeding hammer.

It is a well understood principle of field events that man can exert no power once both feet have left the ground. In hammer throwing any real power must be obtained when both feet are on the ground. The "power arc" mentioned above exemplifies this. Once the thrower reaches the end of his "power arc" he executes his heel and toe turn, during which his left foot never loses contact with the ground. At the back part of his turn when the right foot is coming around the left ankle he is balanced on the side of his left foot. From this one legged position there is some doubt about his ability to exert power but he does maintain control and speed by leaning against (away from) the force of the speeding hammer. This leaning away from the force of the hammer has been mentioned as "pit".

As each successive turn is executed the momentum of the hammer builds. The faster the hammer travels the more necessary it is for the thrower to pit himself against this centrifugal force. As the speed increases, the right foot has to get back on the ground that much more quickly so the thrower can start his next power arc. Getting this right foot in position before the hammer comes around is called "beating it in". The pushing action of the right toes, mentioned before, helps get this foot in faster.

Important Points on Hammer Turns

1. Thrower must complete each turn. Working to the left of the circle indicates a failure to do this.
2. Keep center of gravity over the left foot to maintain one axis.
3. Hammer throw should be considered as one continuous accelerated motion, not as three distinct turns.
4. Keep left foot in contact with the ground at all times; jumping reduces speed.
5. Use only as much speed as can be controlled.
6. Right foot pushes off at start of each turn.
7. Throughout the turns, head, shoulder, and large body muscles precede the hammer.
8. Maintain proper width of stance throughout the turns.
9. Allow the hammer to reach its full orbit. Anticipating the final release may cause "drag".
10. Keep the upper body relaxed. The only pressure felt in the upper body is that building up in the left arm.
11. Left leg must remain bent throughout all the turns. The left leg never straightens until the final release.

Flight of Hammer

The flight of the hammer is directly controlled by the plane of the orbit which has been developed throughout the turns. If a man has a very flat plane to his orbit he can not change this plane just prior to release without destroying the continuity of motion and thereby some of his momentum. An average size man should have no difficulty with flight trajectory if he is able to keep his low point where it belongs (Off his right foot).

Factors Affecting Flight

1. Failure to keep the low point to the right.

   As low point moves around to the left there is less chance to use leg lift in the final release. There is then a tendency to pull with the back or with a bent left arm. These result in low throws.

2. Leaning too far to the left.

   This causes "drag" therefore flattening the plane.

3. Legs too straight prior to release.

   As in item 1. this also causes excessive pull with the back.

4. Raising of the arms up and down throughout turns.

   This destroys momentum and invariably causes a straightening of legs.

5. Raising the hands higher than eye level at the high point in the turns.

Release

A good release in hammer throwing is probably one of the most elusive things in track and field.

As one looks at the number of turns and position of delicate balance which a hammer thrower must go through before he gets to the release stage, it is easy to see why a good release is so hard to find.

The release is the culmination and climax of all the power and speed which the thrower has been building in his three turns. It is a great deal more than just letting go of the hammer on the extreme left hand side of the orbit. The thrower starts the release motion at the beginning of his power arc as his right foot hits the ground after his third turn. At the split second that his left arm straightens out and the hammer is sweeping down toward the low point he leans into a position of bent legs and begins to shift all his weight to his left leg.

As the hammer sweeps through the low point he increases his torque, and his momentum, by leaning back against the hammer. Simultaneously with this lean back of the body his legs begin to exert a tremendous lifting motion as the hammer starts to rise in its orbit away from the low point. If the low point has been allowed to rise away from the ground, the leg lift in the release, which is so terribly important, is proportionately reduced.

As the hammer is rising to the left of the thrower there is still flex in his knees. This slight remaining knee bend is expended as the final whip climaxes all the speed and power built up to this point. As the hammer leaves his hands at the furthest point left in the orbit, the thrower balances himself in a crossed leg position at the edge of the circle.

Comments on Connolly's Style

1. Harold Connolly spent two summers in Europe competing and studying.

2. He works to keep center of gravity over the left leg. The theory behind this is to work for one axis.

3. The hammer never sweeps past the center of the body.

4. The right foot pushes off at the start of each turn. He tries to keep his right heel off the ground as his body prepares for a turn.

5. Uses an extreme right twist of the body for an early pick-up at the start of each turn.

6. Head, shoulder, and large body muscles precede the hammer.

Connolly's Training Methods

1. Practices every day except one or two day lay off before very important meets. Even practices the day before ordinary meets.

   In off season he practices twice a day.

   Always practices the day after a meet.

2. Workouts - 80 minutes a practice session - 20-25 throws.

3. Warm-up - jogging easy quarters -- no real sprinting.

4. Uses less than full circle on his warm up throws (6-8 inches less).

5. Likes to work by himself - feels he can concentrate on his form.

6. Keeps a detailed log of all practice sessions and competition. Studies notes at night.

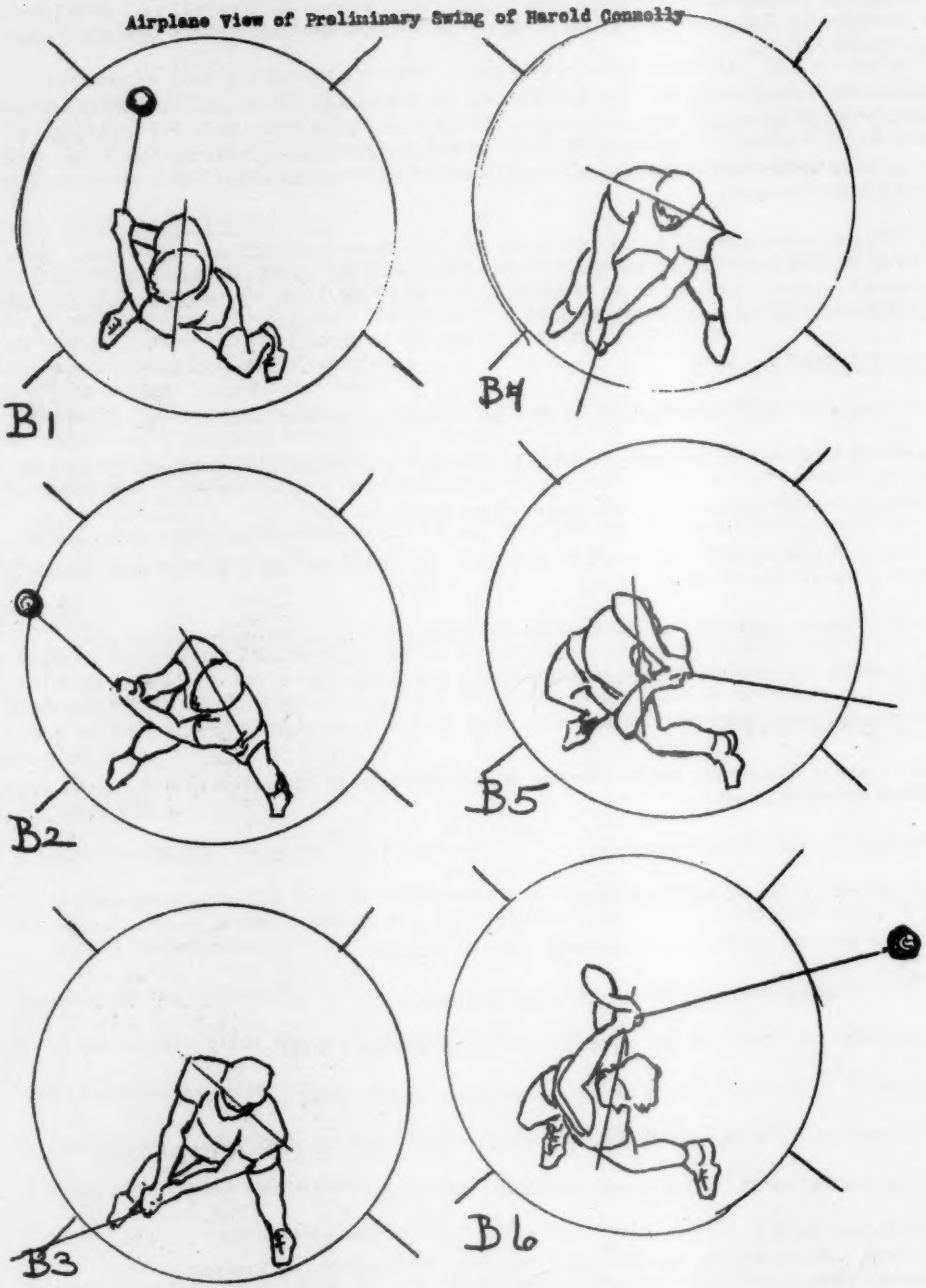
7. Works for perfection at intermediate distances. (180-185)

8. Heavy weight lifting program.
   Pre-season - Heavy lifting for strength - Monday, Wednesday and Friday.
   In-season - Heavy and light - Monday and Wednesday.

Diet

1. No coffee -- no smoking -- no liquor

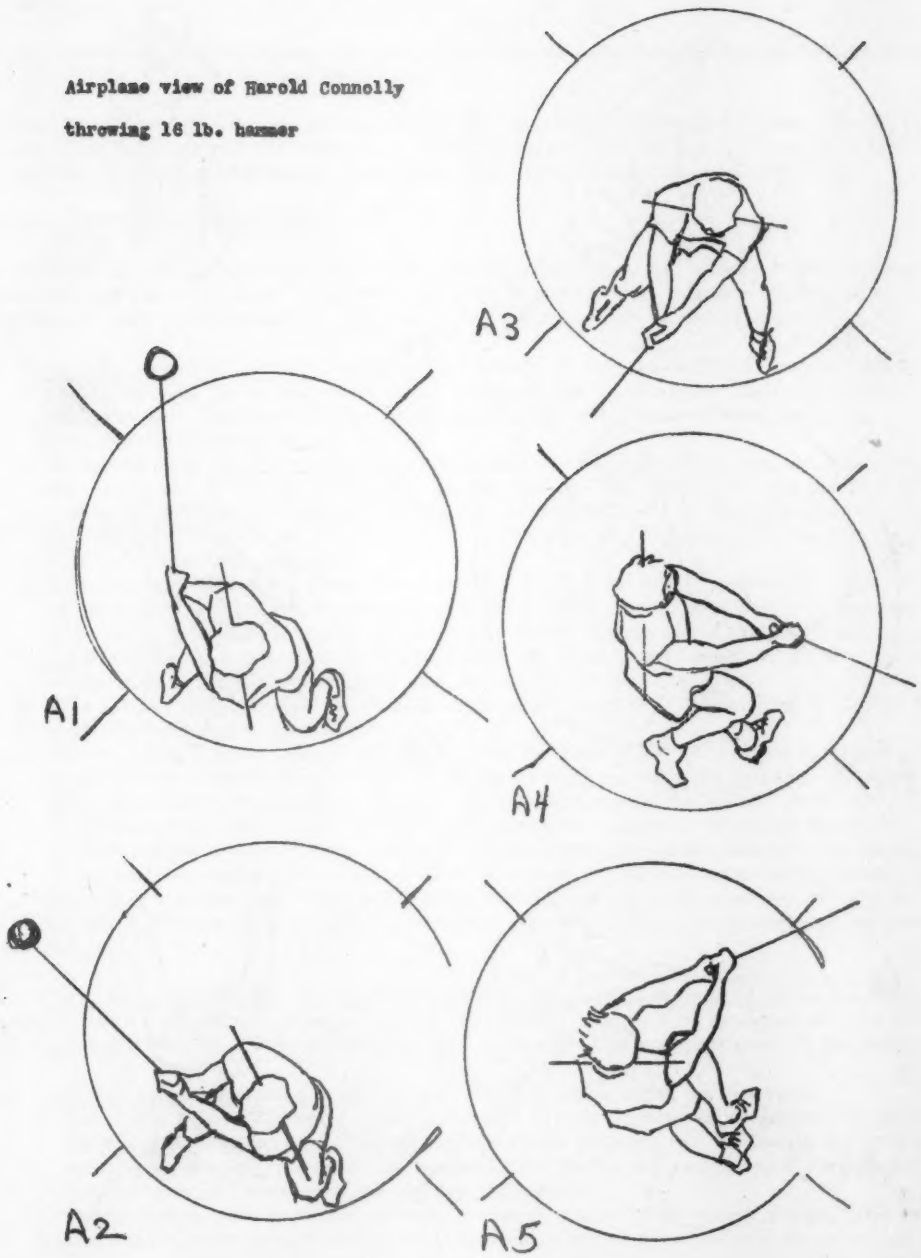
Airplane View of Preliminary Swing of Harold Connolly

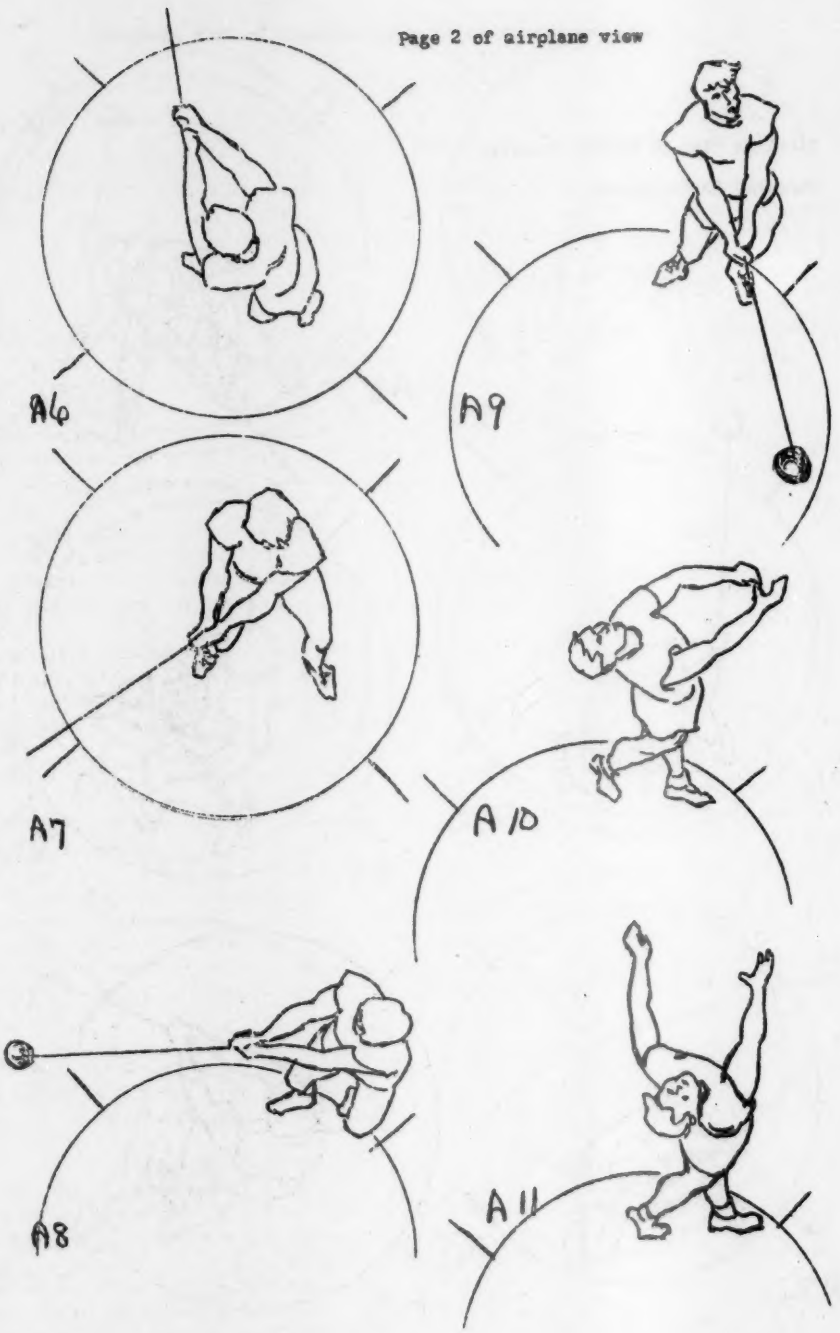


2. Eats regular meals supplemented by:
   a. Vitamins
   b. Protein supplement food
   c. Wheat germ oil

Airplane view of Harold Connolly

throwing 16 lb. hammer

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FUNDAMENTALS OF THE TECHNIQUE OF HAMMER THROWING

By Toni Nett, Track Coach
German Athletic Union

My dear Colleagues:

Allow me first of all to give you the sincerest regards from the coaches and athletes of Germany, as well as the Officers of the German Athletic Union.

Since I have been allotted but 45 minutes to deliver a talk on "Hammer Throw Technique", and since you all know only too well the immensity of this subject in all its details, I must reduce my remarks to cover only the fundamentals of the actions within the circle. Let us first consider the

I - PHYSICAL-TECHNICAL ASPECTS

In hammer throwing, two forces are being brought into play, or, rather a "force team": the centrifugal and the centripetal forces. It must be the task of the thrower to attain the maximum of centrifugal force, and, by way of compensation, to attain also the maximum of centripetal force.

1. The acceleration of the centrifugal force depends on certain technical requirements:
   a) Beginning with the initial swing of the hammer, the acceleration must be evenly progressive. The speed of the implement is increased from a slow beginning over two accelerated swings.
   b) With each first half-pivot, the speed is further accelerated by a conscious pressing of the legs in the direction of the spin, particularly of the right leg. The old conception, according to which the athlete, during these first half-pivots, allowed himself to be pulled by the implement, has been discarded by the best athletes and coaches, since it proved to be less effective.
   c) In each second half-pivot of the three turns a further increase in speed is attained by an early re-contact of the right foot with the ground, bringing the pelvic axis ahead of the axis "hammer/arms". Through this early contact of the right foot and bending of the knees a light pull is effected upon the head of the hammer, producing, in conjunction with the gravitational pull, a further increase in speed.
   d) This speed is still further increased at the next moment by a "hanging in" of the body back of the centre of rotation.
   e) The centrifugal force receives its final acceleration in the delivery spin. While the weight of the body in the previous spins centered more over the left leg, it is now being transferred to the right leg by a backward thrust of the body. Now, with all the power of the legs, torso and extended arms, the hammer is pulled forward/upward for the delivery. The angle of delivery depends on the strength and height of the athlete, and should be about 40 to 45 degrees. According to the German Physicist Schuppe, the centrifugal force of the hammer at the moment of release amounts to more than 450 English pounds, a nearly thirty fold increase of its own weight.

2. The acceleration of the centripetal force - We have seen, as stated in the beginning, that the centrifugal force must be counteracted by the centripetal force. This counteraction is effected by an increased degree of "hanging in" combined with an ever increasing counterthrust of the bent legs.

3. Physical Laws pertaining to the Turns - The following must be observed:
   a) The pelvic basin (center of gravity) rotates with an almost constant radius around the vertical axis running through the ball of the pivoting foot, although there is a small progressive increase of this radius due to the increased angle produced by the "hanging in" necessity, as earlier explained.
   b) There ensues a progressive advance in the direction of the throw and parallel to it.
   c) The pelvic basin (center of gravity) must at all times rotate within its orbit, so to speak; a raising and lowering within the segments of a given turn must be avoided. The reduction of the angle, produced by increased "hanging in", must be smooth and gradual.

II - THE PRACTICAL REALIZATION OF THESE PHYSICAL LAWS

Due to lack of time, I can only touch upon the elementary aspects of this phase.

1. The initial swing - The execution of the initial swing is, today, individually different. I shall be pleased to demonstrate some of these styles through a motion picture on the subject. It is important that the acceleration of the hammer be smooth and gradual, devoid of any sudden jerks.

2. The "heel-and-toe" turning method, which I shall also show on film, must progress through the circle parallel to the direction of the throw and without, if possible, any deviations from it. This last demand, however, pertains solely to the center line between the left and right foot imprints of the thrower; the foot imprints themselves proceed in tapering lines decreasing toward the front of the circle. In other words, the feet are farther apart in the initial stance than in the position of delivery or release of the implement.

3. The knees remain bent during all the turns, and as nearly as possible in the same degree. This helps to prevent the raising and lowering of the center of gravity of which I spoke before.

4. The drag of the hammer head during the turns - Contrary to former usage, today's best hammer throwers accelerate the speed of the hammer head consciously and actively in the first half turn of each turn. This produces a twisting of the body, or, the pelvic axis rotates to some degree ahead of the shoulder axis. Thus the hammer head drags somewhat behind.

In former times, this conscious acceleration of the speed of the hammer by means of leg action was considered an error. Therefore, the thrower, after he set down the right foot, allowed the hammer to proceed passively to a point directly in front of him (when it reached a point 90 degrees in relation to the shoulder axis) and then allowed himself to be pulled - by the hammer - into the following half turn. The modern method calls for the right foot to but fleetingly touch the ground for support and a short but snappy push for increased acceleration of the hammer.

5. The weight of the body tends to rest on the left leg. The immediate consequence of the hammer drag described in the previous paragraph is a shifting of the body weight during the turns upon the left leg for balance. According to the old method, and for the reasons just mentioned, the weight of the body centered more upon the right leg.

6. The arms are always relaxed and "long". Any bending of the arms disturbs the hammer's plane of rotation as it also shortens its radius. Thus the elementary requirement of the improved technique of hammer throwing consists of a conscious press or push of the legs during the turns and in their direction, while the arms remain relaxed and "long". It is not easy to achieve this apparent contradiction of active legs and passive arms, and it will be only after many errors that this phase will be mastered.

7. Avoid "jumping" during the last turn. The tremendous centrifugal force developed up to this time tends to pull the thrower off the ground and off balance. To counteract this, today's hammer throwers "hang" themselves still deeper "into the hammer" and consciously make themselves "shorter" and "heavier", and thus create - in addition to the aforesaid - a favorable transition into the straightening of the body prior to the release of the implement, a motion clearly observable in the next to last step of a high jumper before his take-off. A "jump" during the last turn would result in a jolt to the right knee, causing a momentary delay in the straightening action, as also a disturbance of the balance of the thrower and a shock-like disturbance of the plane of flight of the hammer.

8. Shifting of the weight in the delivery. The delivery stance of the best hammer throwers of today is practically identical, as I hope to be able to show you by means of motion pictures, Torso arched backwards, head tucked against the neck, a thrust of the now straightening left leg and a shifting of the body weight to the right leg, which continues to pivot until after the release of the hammer.

You see that a complete turn-about has taken place in the conception of an economical style of throwing: in the old days, the weight emphasis was - in the turns - on the right leg, and in the delivery on the left leg. Today we have come to appreciate the exact opposite, the weight centering above the left

leg in the turns and above the right leg in the delivery.

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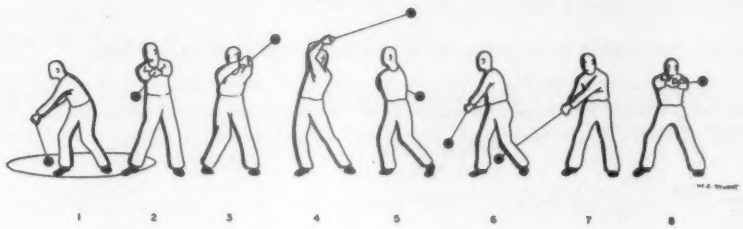
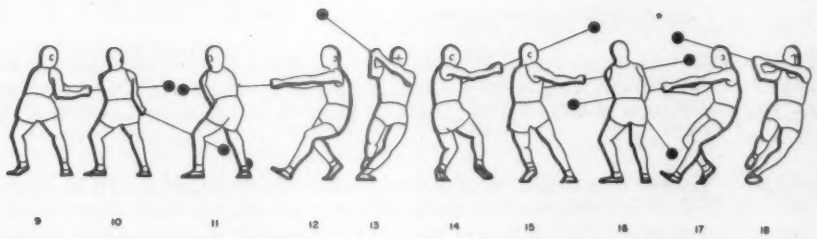
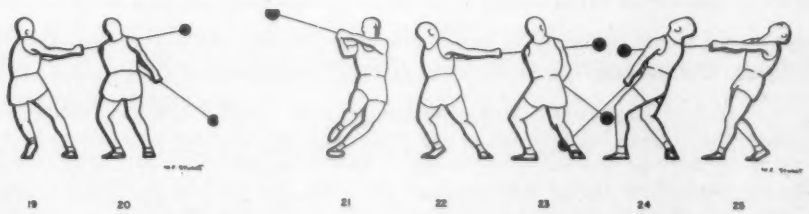
I shall now proceed to demonstrate various phases of this subject by means of slides and loops, showing the world's best exponents of this event, as I saw and photographed them.







THE DECATHLON

by: Elvin Drake
University of California
at Los Angeles

The Decathlon is a subject that I find rather difficult to speak on. As you know, it is composed of ten of the events which we have in a regular track meet. These events will be covered in detail during the course of these meetings, so I know you are not interested in my talking about forms or techniques in any or all events.

There are those much better qualified than I to talk about the events.

As you know, the Decathlon is made up of ten events which I classify into:

4 RUNNING EVENTS	3 JUMPING EVENTS	3 THROWING EVENTS
100 Meter	Broad Jump	Shot
400 Meter	High Jump	Discus
1500 Meter	Pole Vault	Javelin
High Hurdles		

The following chart is an interpretation of the scoring chart in terms of feet and inches. This is the only way that it means anything to me. The chart changes to give more points per unit as the performance improves. This interpretation is to fit the average man in each event:

100 under 10.8 45 pt/10	Brd. J. over 24' 10 pt/in.	Shot over 47' 33 pt/ft.
over 10.8 38 pt/10	under 24' 7½ pt/in.	
		Discus over 140' 10 pt/ft.
400 under 50 sec. 8 pt/10	Hi Jump over 6' 35 pt/in	
over 50 sec. 7 pt/10	under 6' 33 pt/in.	Javelin over 160' 5½ pt/ft.
1500 under 5 min. 8 pt/sec	Pole Vault over 12' 13 pt/in.	
over 5 min. 6 pt/sec	under 12' 9½ pt/in.	
H.H. under 15 sec. 28 pt/10		
over 15 sec. 24 pt/10		

The Decathlon is rather a precarious event in which anything may happen. For example, you get 3 trials in the shot, discus, javelin, and broad jump. In the broad jump in particular, you must be sure of your step. To step over the board three times would be disastrous. I believe it is important to know as near as possible the limit of your ability in the events I have mentioned above, and when you are near that limit, you must make a decision as to whether you should take another turn or save the energy for some other event. Bob Richards says the Decathlon is easy, but most boys feel that it is a stamina event.

In the Decathlon it would probably be better discussed by one who has competed in the events. I was chosen, perhaps, because I happen to be coach of the world record holder in this event.

It was my pleasure to discuss the Decathlon one day with Floyd Simmons, who represented the United States in both the '48 and '52 Olympics. He feels, as I am sure all of us do, that a man should work with the event in which he has the best chance to improve, and which will net him the greatest return in points. He uses as an example himself, in the shot. He says he worked with the shot for a long time and found that, in good physical condition or bad, he always put about 42 feet, so he never bothered with that event. He also had one rather unusual remark that he had put about 46 feet, but when he did a lot of running it dropped to 42 feet. This could, I suppose, be due to a loss in weight. This remark would indicate that a boy might have one or two events that he could not help by working on them. I personally doubt if this is true.

Floyd feels that the new scoring chart, as such, has given a better chance to the specialist. I think you know what he means by this -- when a boy is a specialist, he can pile up a great amount of points. He may have a good idea here. I am not prepared to argue the point, but I do believe that this takes the incentive away from the good average athlete. I would say that today's Decathlon man must be one who is superior in all the events, or a specialist in about five of them and at least average in the others.

Decathlon is a stamina event. It takes a lot of repetition work. In all conditioning work for all athletics, there is no substitute for running. Therefore, the Decathlon man must do a great deal of repeat running.

Another event for the Decathlon man to work on a great deal should be the pole vault, not with the idea that he will perhaps ever become a great vaulter, but for the development which this event will give to the arm and shoulder girdle. This strength should add to the performance in the weight events, namely, the shot, discus, and javelin. There are, to be sure, other ways to develop arm and shoulder strength, and to gain it by vaulting, may not be of sufficient importance. The pole vault as an event also has running and jumping as part of the processes involved.

This all leads me to believe that pole vaulting is a good event to work on for general development. Many of our all-around boys lack skill in the pole vault and need practice for this event. I feel that in the case of Bob Richards, he does a better job in the weight events than he would otherwise because of his work in preparation for the pole vault.

I also believe that a boy should go all out in every event. He should not think it possible for him to make it up somewhere else.

Jim Thorpe was the champion for a long time. Then along came Mathias, setting a new world's record, and we thought this would not be broken for years; but it has been, and, at the present time I believe there are two or three, or perhaps as many as six, men in the world who might break the present record, among them Kuznetsov of Russia and Campbell and Johnson of the U.S.A.

Another thing you may not have noticed about the Decathlon is that all of the best boys in the U.S. have been hurdlers, -- Mathias, Simmons, Albans, Johnson and Campbell.

We said a moment ago that the Decathlon was a series of events which required a great deal of endurance. I believe that the two events which require the most skill are the hurdles and the pole vault. I do not mean to insinuate that it doesn't take skill in the others, but I believe it takes more in these two.

When I talked to Floyd Simmons about the Decathlon, he told me he thought it was an older man's event. I don't quite follow his thinking about this because when Mathias was champion, he was still a high school boy, and Rafer Johnson is only twenty years old. But what Floyd really meant was that he believes that the older athlete with more years of experience has more poise and strength than the younger boys.

This brings up something else that I think is of great importance to the Decathlon competitor. He must have the ability to relax between events. I have noticed this about both Mathias and Johnson (I have never seen Campbell in a Decathlon); they both have that remarkable ability to relax--I would say almost go to sleep between events. This ability makes it possible to conserve their energy, both mental and physical.

As far as the events are concerned, you have experts far more learned than I to discuss them, and I would not attempt such a discussion.

I know I was supposed to tell you how Rafer has been preparing himself for the trials.

In any athletic event, there is no substitute for running. So, he has been doing some running every day, sometimes repeat or interval running, sometimes finishing the day with one or more 440's. He has worked on hurdles almost every day. We try to rotate the field events to keep him strong for throwing.

In some of the events, he works with a sort of recreational attitude--never too serious about them. As he works on these events we make suggestions and help him.

During the season, we have tried to rotate Ray into different events in our dual meets, in order that he might have actual competitive experience in each of the events.

I did not feel the need for pictures, because I'm sure there would be much to want for in the skills of some of the events. Performance, rather than skill, is the thing we look for in Decathlon.

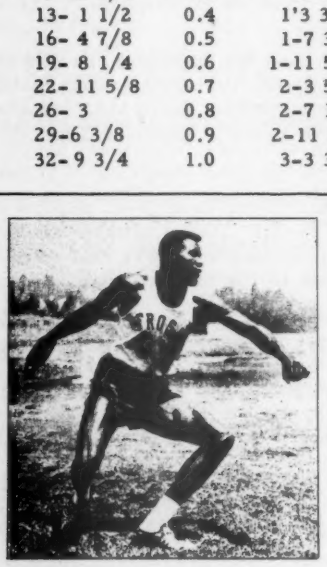
CONVERSION TABLES
FEET AND INCHES TO AND FROM METERS

1. To convert feet and inches to meters add together the separate metric values from the following columns. First hundreds of feet, then tens, then units, and finally inches and fractions of inches. The sum of metric values will be the complete metric equivalent.

Feet	Meters	Feet	Meters	Inches	Meters	Inches	Meters
10'	3.048	1'	0.305	1"	0.025	1/8"	0.003
20	6.096	2	0.610	2	0.051	1/4	0.006
30	9.144	3	0.914	3	0.076	3/8	0.009
40	12.192	4	1.219	4	0.102	1/2	0.013
50	15.240	5	1.524	5	0.127	5/8	0.016
60	18.288	6	1.829	6	0.152	3/4	0.019
70	21.336	7	2.134	7	0.178	7/8	0.022
80	24.384	8	2.438	8	0.203	1	0.025
90	27.432	9	2.743	9	0.229		
100	30.480	10	3.048	10	0.254		
200	60.960			11	0.279		
300	91.440			12	0.305		

2. To convert meters and fractions to feet and inches, add together the equivalent values from the following table of Tens, Units, Tenths and Hundreths of meters.

Meters	Ft. & In.	Meters	Ft. & In.	Meters	Ft. & In.	Meters	Ft. & In.
10 M	32'-9 3/4"	1M	3'-3 3/8"	.1M	4"	0.01M	3/8"
20	65 -7 3/8	2	6 -6 3/4	0.2	7 7/8	0.02	3/4
30	98 -5 1/8	3	9-10 1/8	0.3	11 7/8	0.03	1 1/8
40	131 -2 3/4	4	13- 1 1/2	0.4	1'3 3/4	0.04	1 5/8
50	164 - 1/2	5	16- 4 7/8	0.5	1-7 3/4	0.05	2
60	196 - 10 1/8	6	19- 8 1/4	0.6	1-11 5/8	0.06	2 3/8
70	229 - 7 7/8	7	22-11 5/8	0.7	2-3 5/8	0.07	2 3/4
80	262 - 5 5/8	8	26- 3	0.8	2-7 1/2	0.08	3 1/8
90	295 - 3 1/4	9	29-6 3/8	0.9	2-11 1/2	0.09	3 5/8
100	328 - 1	10	32- 9 3/4	1.0	3-3 3/8	0.10	4



Rafer Johnson

EVOLUTION OF WEIGHT TRAINING EXERCISE

By Ray Van Cleef
San Jose, California

According to the laws of aerodynamics, the bee is of such a shape and size that it is utterly impossible to fly. The bee, however, being ignorant of this science proceeds to fly and, in addition, makes a little honey. A similar state of affairs existed until late years in connection with athletics and weight training exercise. The only real difference was that some athletes freed themselves of the shackles of dogmatical misconceptions. These rebels defied the prophets of doom with their warnings of "muscle bound", rupture, heart strain and slowness. In many instances, training with weights was kept a deep dark secret for fear of censure and ridicule. Some were not timid about revealing their condemned training with the villainous weights. Occasionally such defiance resulted in rather drastic curbs.

This calls to mind the case of James B. Juvenal of Philadelphia. From the time he was sixteen, Juvenal owned and regularly used a 75 pound dumbell and a 150 pound barbell of the old solid type. At that time the adjustable plate loading weights were not readily available. Being an ardent oarsman, Juvenal kept his weights for the sake of convenience at the boat club he competed for. One day his precious weights vanished. Upon checking with the janitor at the boat house, he discovered they had been tossed into the river at the command of the captain of the club. Needless to say, this determined young athlete lost no time in securing an explanation from the captain for this highhanded order. The club leader felt he was justified in this action to protect the other members from the dangers of getting muscle bound and stiff from such physical culture faddism. This by no means ended Juvenal's weight training, for he managed to retrieve his muscle builders from the river. He continued on combining this result producing body building along with his rowing. Not only did he continue on with this body building along with his rowing, but he also made progress to the extent where he won numerous major rowing events over a period of years of competition. This included the National Championship for Single Sculls.

There have been many athletes of outstanding ability in the past that were obliged to cope with the opposition to weights. The "muscle bound" bugaboo was almost a phobia when the subject of weights was even discussed. With a grim warning it would be pointed out that training with barbells and dumbells would inevitably produce slowness. Comparing the ponderous truck horse with the speed of the lean race horse was a frequently cited parallel and on the surface seemed quite convincing. Propaganda of this sort, especially the emphatic censure of weight training by innumerable well-meaning but mistaken athletic directors and coaches, unquestionably served to isolate countless thousands of athletes from this form of exercise. Because of this a great many of our best athletes of past years could have improved upon their top performances had they had the advantage of the present-day proper use of this result producing form of progressive training.

The misconceptions that prevailed in past years are understandable. In the latter part of the 19th century and even in the beginning of this century the use of weights was generally identified with the professional strong-man. Far too many of these stage athletes were somewhat elephantine in their characteristics. This mental image created a barrier that was difficult to eradicate. Dumbells and barbells during those periods were for the most part cumbersome in size and difficult, if not impossible, to adjust in weight. To attempt to experiment with such unwieldy objects was apt to prove a discouraging experience. The variations in poundage were usually so extreme that the weights were either too light or too heavy for the newcomer to use to advantage. This did involve the risk of strain where the novice was foolhardy enough to disregard caution and attempt to hoist a ponderous weight beyond his capacity. Conditions such as these all contributed to the opposition to the use of weights, especially where it involved the competitive athlete in sports where speed and agility are at a premium.

Approximately a half-century ago, nutritionists first became aware of the role of vitamins. This discovery revolutionized some of the concepts of diet and stimulated scientific research. All of this has contributed an immense wealth of knowledge of the vital part food plays in health and in the prevention of disease.

Even before the introduction of the vitamin factor, there was a revolution underway in the field of

weight training exercise. One of the foremost pioneers of this movement was Theodor Siebert of Germany. Incidentally, Prof. Siebert is now approaching his 90th birthday. His experiments with a variety of athletes and body builders convinced him of the unappreciated merits of progressive exercise. Results furnished irrefutable proof to spur his efforts on. His missionary endeavors to foster weight training influenced quite a number of physical training experts, as well as athletes.

One of Siebert's disciples was an American named Alan Calvert, a zealous enthusiast with considerable wealth. In the first decade of this century, Calvert started the Milo Barbell Company in Philadelphia. He also established Strength magazine to serve as the much needed propaganda organ. Fortunately, Calvert was a man of high caliber in both his talents and character. His early efforts with Strength and his Milo Barbell Company fulfilled an invaluable part in exerting an intelligent influence in promoting the use of weights in the face of deep-seated opposition.

Father B. H. B. Lange of the University of Notre Dame was one of the most important adherents of Calvert's teachings in behalf of the merits of progressive exercise with weights. Some of Father Lange's enthusiastic support could be linked with the remarkable physical progress he achieved in his own training efforts with weights. For a number of years, this educator served as the director of athletics at this famous university. His ardent interest was responsible for establishing a weight training gym. This has been extensively used by thousands of students over the years, including hundreds of team members. Father Lange, now past the age of 60, is still a keen booster for the use of weight training and conducts the special weight training gym as a pet hobby.

Very likely, the first prominent connection between weight training and track and field athletics' in this country can be linked with W. B. Curtis and H. E. Buermeyer, both of the New York A. C. Back in 1876, Bill Curtis was the national hammer throwing champion. Two years later he repeated in this event and also annexed the national title for heaving the 56 pound weight for distance. This same Bill Curtis was also prominent as a weight lifter. Some of his feats of strength in lifting were outstanding. His contemporary, H. E. Buermeyer won the national championship for putting the 16 pound shot for three consecutive years, 1876 through 1878. Like Curtis, he was a capable weight lifter and also excelled in sprinting. Their success in track and field should have furnished convincing evidence that the use of weight training could be an important asset. However, it required many more years and many more examples to promote an awareness of this fact.

One of the next national champions that served to encourage the use of weight training was Jack Merchant. This athlete, who possessed the physique of a well-muscled weight lifter, came into the foreground in 1922 when he scored a double win for the University of California at the National Collegiates in the hammer throw and shot put. Jack Merchant was also a first rate performer in the broad jump and sprints.

It should not have been too unexpected that barbell and dumbell lifting athletes would excel in the weight throwing events. A realization that progressive exercise with weights was by no means limited to such events was greatly aided by the record breaking performances of Les Steers in the high jump. Back in 1941, this star performer established a world mark of 6'11" that was to endure for years. Les Steers was a superman in physique, not the typical slim giant that normally predominates in the high jump. His training included a frequent use of barbells. It is well known that Steers on more than one occasion cleared 7' unofficially in exhibition performances.

One of the most energetic boosters for the use of weights in connection with sports has been Bob Hoffman, the founder-director of the York Barbell organization and his Strength & Health magazine. Since 1932, this extensively circulated monthly has been stressing the benefits of progressive exercise with weights to foster improved athletic ability. Month after month publicity has been released in this publication to feature competitive athletes who have demonstrated the advantages of this training. There have been frequent articles by highly regarded experts, including Dr. C. H. McCloy of the University of Iowa. It is of interest to point out that Dr. McCloy is a firm believer in the manifold benefits of this type of training. In fact, he is quite remarkable in his own physical accomplishments with weight training.

During the six years I was associated with Strength & Health as an editor, I had the privilege of giving well deserved publicity to a number of personalities prominent in the world of sports. One of

these celebrities is Percy Wells Cerutty, the long distance running coach of the '52 Olympic team group from Australia. Cerutty has had a rather unusual career in track and field. He retired from competition as a middle distance runner at the age of 24. Years later, when his physical condition was at a low ebb, he decided to make a determined effort to improve his state of health. In striving to accomplish this, he combined the use of barbell training with running. He made such remarkable progress that he was encouraged to return to competition when past the age of 45. At the age of 50, he was winning long distance running events in major meets. Since concentrating his efforts on coaching, he has contributed to the development of such outstanding runners as John Landy, Don MacMillan and Les Perry. In all cases he has included suitable weight training exercises in the program of such top runners as these. In writing to me he stated, "No athlete in these modern days can hope for top success in the intense white heat of competition who does not condition himself with resistance."

Another outstanding performer I had the pleasure of featuring in Strength & Health was Irving "Moon" Mondschein, the national decathlon champion of 1944, 1946 and 1947. One of the top performances of this versatile athlete was a high jump of 6'7-7/8". Mondschein has for years been ardent in his active interest in weight training exercise. At the time of the 1948 Olympic Games at London, when I was serving as the trainer for the U. S. weight lifting team, I observed Mondschein performing barbell exercises. Now he is encouraging his students to gain from the benefits of weight training exercise. The April, 1956, issue of the Scholastic Coach released an article by this former champion titled, "A School Program in Weight-Lifting".

The subject of champion decathlon performers calls to mind, of course, the Rev. Bob Richards. While the spotlight of fame is usually focused on his many honors as a pole vault champion, still his success in the decathlon and all-around contests is truly outstanding in victories. Richards is an enthusiastic booster for the use of weight training exercise. Strength & Health in April of 1952 had an impressive front cover photo of this Olympic champion using a barbell. While aboard the S. S. America on the trip to the London Olympic Games, I had the opportunity to take a number of photos of Richards training with weights.

When it comes to promoting the use of weights in track and field, I doubt if anyone has been more cooperative than Otis Chandler. His own career was truly revolutionized through the use of progressive exercise with weights. When he was first active as a competitor at Stanford he was a high jumper. At that time he was on the slender side. Through the systematic use of weights, Chandler gained some 70 pounds of body-weight in the first seven months of his body building training with the weights. This gave him the muscular bulk and power to concentrate his efforts in the weight throwing events. Chandler's success in the shot put is well known. A few years back he surpassed 57' in competition. Chandler not only trains with weights in connection with the shot put, but also for weight lifting competition. Not too many years ago I was the referee in a meet where this champion athlete made a clean and jerk of 330 pounds, a very capable lift. Very likely, a number of the coaches already have a copy of Otis Chandler's informative treatise on the merits of weight training and suggested routines for various events in track and field. This can be obtained gratis from Chandler by writing him in care of the Los Angeles Times, Editorial Dept., Los Angeles, California.

Fortune Gordien, the world's record holder in the discus, was encouraged by Otis Chandler to gain in his speciality through the use of weights. At the time Gordien commenced this new program, which was about three years ago at Farbornik's body building gym in Pasadena, he had been in a slump. He realized he was obliged to take action to regain his championship form. Within a period of months of weight training he not only attained this goal, but succeeded in boosting the world record to the tremendous distance of 194'6".

Another of our greatest track stars to be identified with weight training is none other than Mal Whitfield, twice Olympic champion of the 800 meters run. His training with weights spans a period of years. Two years ago, Whitfield made a guest appearance at the National Weight Lifting Championships at Los Angeles. On this occasion he made mention of the benfits he had derived from weight training, and urged that proper use be made of this valuable aid by other athletes.

Recently at the Stockton meet I had the opportunity to witness Parry O'Brien heave the shot 61'8 and a fraction inches, beyond his own world's mark. Unfortunately, it was on an extra put, so it does not qualify for an official record. It's only a question of time before this herculean athlete exceeds 62'

in this event. O'Brien has also been adding to his laurels in the discus throw. As to be expected, he also uses weight training to advantage.He freelyencourages other competitors to benefit from the use of weights. One of the best proofs of his versatility occurred on an A. A. U. sponsored tour of Europe. On this occasion he substituted for a teammate in the 100 meters run and covered the distance in the credible time of 10. 8 seconds. It is appropriate here to call attention to the fact that O'Brien's closest rival, Bill Nieder of the University of Kansas, also uses weight training to advantage. Nieder and O'Brien are the only two shot putters in the world to exceed the 60' mark.

It would be somewhat difficult at this time to list many top performers in the weight throwing events who are not linked with progressive exercise with weights. Stan Lampert, who once held the record at 59'5-7/8", Hal Connolly, who has exceeded 200' in the hammer throw, and Bob Backus, the top performer in the 35 and 56 pound weight throws, have become champions through the proper use of weight training in connection with their specialities.

Lately it was revealed that Dave Sime, the sprint sensation, has employed barbell training. This is no surprise to anyone who has observed the physique of this superman in spikes.

Success most certainly breeds success and so with weight training; it now embraces the globe of our sports world. It is now common-place for top track and field athletes in all regions to utilize the benefits of progressive weight training. In an article, "The Road to Success" by Geoffrey Dyson, appearing in the November, 1953 edition of World Sports, there was a strong recommendation for the proper use of weight training. This highly regarded expert, the Chief National Coach of Great Britain, issued such statements as these: "The athlete of today must be strong. The need for this in the throwing events is generally appreciated, but strength is required, too, in jumping, vaulting, sprinting, and even in long distance running." Also stressing the merits of the use of weights is the famous coach, Franz Stampfl. In a recent article for a Melbourne newspaper, he pointed this out emphatically in this manner: "Muscular strength is the determining factor, particularly in all movements where explosive speed and perfect balance are vital to first rate performances. Weight training should be part and parcel of the training program of every athlete."

It is of interest to call attention to the fact that this rapid expansion in the use of weight training is not confined to the male sex. Canada's Jackie MacDonald, for example, uses the weights to improve her capacity in the shot put and discus throw. Yvette Williams of New Zealand has trained with weights to advantage. At the 1952 Games this athlete established an Olympic record in winning the broad jump event.

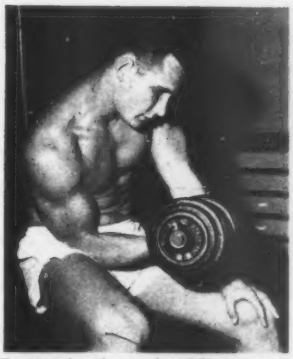
Of late years, there's been a considerable amount of scientific research to support the merits of weight training. An illustration of this is the experiment conducted by Zorbas and Karpovich to test the speed of muscular movements of weight lifters as compared with the non-lifters. Some 300 subjects of each group were checked. It was found that the lifters were the fastest and students from a liberal arts college the slowest. Dr. Christopher Woodard, Honorary Consultant to the British Olympic Teams, 1948 and 1952, recommends the use of resistance exercise with weights in the treatment of various athletic injuries. He also urges the application of this type of training to reduce the possibility of muscular injuries in sports. This appears in his rather recent book on this subject, titled "Sports Injuries".

This rapidly growing approval of weight training for athletics has stimulated a number of books along these lines. The most recent one is "Weight Training in Athletics" by Murray and Karpovich. Not too long back there was another bearing a similar title by Oscar State. This is chiefly confined to the role of weights in connection with track and field events. Articles along these lines have been appearing quite often in the technical athletic journals.

There are so many other factors that could be mentioned as contributing influences to this world wide recognition. To attempt to deal with them, even in a concise way, would consume too much of the allotted time. Before closing, I do wish to call attention to the fact that the University of California here was one of the first schools of higher learning in the nation to accord credit to weight training in the physical training program. Ever since these classes have been available, the demand has always exceeded the available accommodations for students. Weight training is at present so extensive in colleges and universities throughout the nation that Intercollegiate Weightlifting Championships are now an annual tournament. The recent 1956 meet was won by Ohio State University and it involved such schools as

Michigan State, University of Florida, Washington University, New York University and Tulane. For a number of years weight training has been probably the most active section of the YMCA physical training program. Professional gyms featuring this type of equipment are rapidly spreading in all the larger cities.

This boom in the manifold applications of progressive exercise with weights is unrivalled for expansion. The acceleration stems from results. It is by no means confined to track and field. For example, it is also highly successful as an asset to competitive swimmers. The "iron pills" - adjustable barbells and dumbells - can be likened in results to vitamin and mineral concentrates in nutrition. This revolutionary expansion of weight training will continue to become more predominant through enabling athletes to attain the pinnacle of success as champions.



To strengthen the muscles of his arms and shoulders, Parry O'Brien practices a variety of exercises. He is shown at left performing a one-arm curl with a 60-pound dumbell, and at right dipping on parallel bars with 60-pounds added to bodyweight.

Supine pressing on bench with both barbell and dumbells is an aid to Parry O'Brien's discus throwing as well as his shot putting. That's 270 pounds he has shoved up on the barbell! (Photo below by International News Photo, those above by Cecil Charles.)

PARRY

O'BRIEN

The powerful young giant pictured on these pages is Parry O'Brien, the greatest shot putter of all time and also one of the world's best discus throwers. A great natural athlete, O'Brien credits weight training with contributing to his success. The photo below shows him after a clean and jerk of 270 pounds with an exercise set, a feat he performs easily. (All indoor photos by Cecil Charles. Action photo on this page courtesy of the University of Southern California.)

WEIGHT-TRAINING FOR TRACK AND FIELD ATHLETES

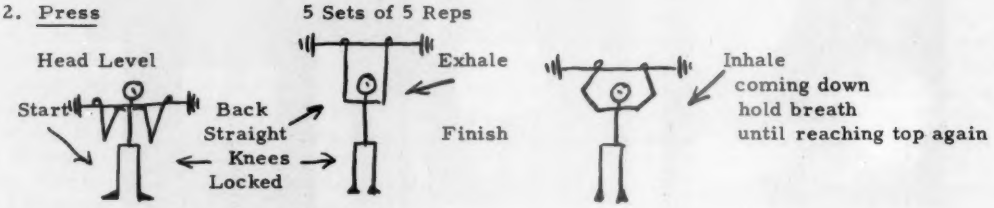
by: Chuck Coker
Occidental College

A. GENERAL BODY CONDITIONING PROGRAM

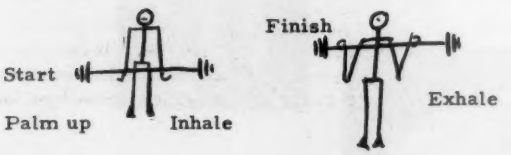
1. Warm-Up — 1 Set - 10 Reps

Continuous 10 times
To the floor and overhead
Normal breathing -

2. Press — 5 Sets of 5 Reps



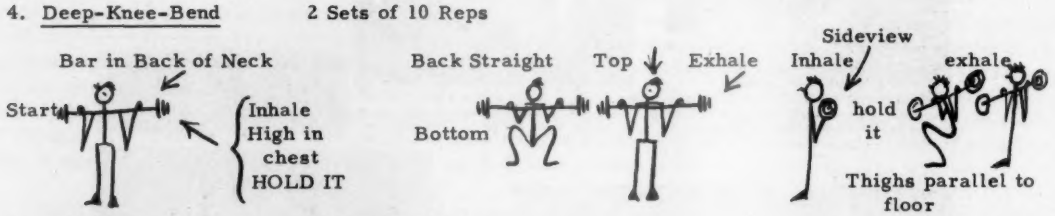
3. Curls — 2 Sets of 10 Reps



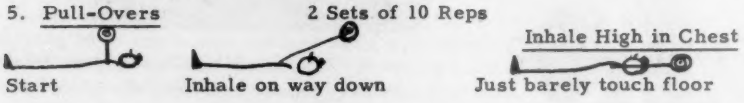
Extend arm full extension
Down and Up -

Keep knees locked and back straight

4. Deep-Knee-Bend — 2 Sets of 10 Reps



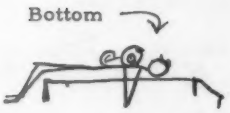
5. Pull-Overs — 2 Sets of 10 Reps



Pull weight back up without relaxing at bottom
exhale at starting position

6. Dead-Lift and Shoulder Shrug — 2 Sets of 10 Reps

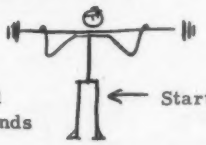
7. Bench Press 2 Sets of 10 Reps

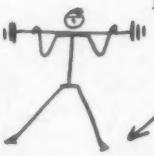


Breathe High in Chest
Thru the Mouth -
Take in a lot of air

8. Straddle Hops 1 Set of 30 Reps

Normal Breathing





9. Sit-Ups and Leg Raises 25 Reps each

10 lbs. to 25 lbs. - Held behind Neck

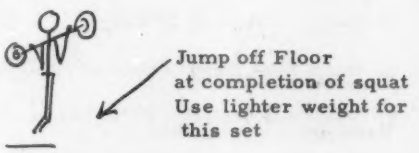
B. SHOT - PUT PROGRAM

1. Warm-Up 1 St of 10 Reps

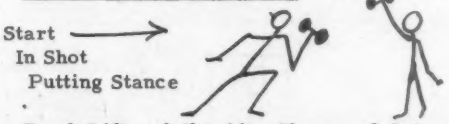
2. Press 5 Sets of 5 Reps - Done rapidly to develop explosive power

3. Curls 2 Sets of 10 Reps

4. Deep-Knee Bends 3 Sets of 10 Reps 1 Set Jumping



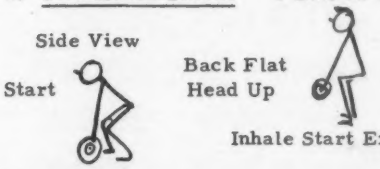
5. Dumbell-Putting Exercise 2 Sets of 10 Reps Each Hand

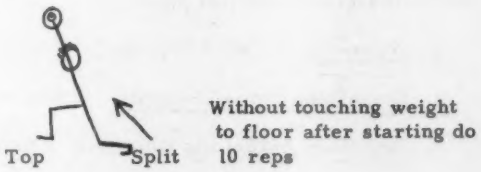


6. Dead-Lift and Shoulder Shrug 2 Sets of 10 Reps

7. Wrist and Finger Curls 2 Sets of 10 Reps

8. Two-Hands Snatch 2 Sets of 10 Reps





C. DISCUS PROGRAM

1. Warm-Up 1 Set of 10 Reps

2. Press 4 Sets of 5 Reps

D. CANNAM,

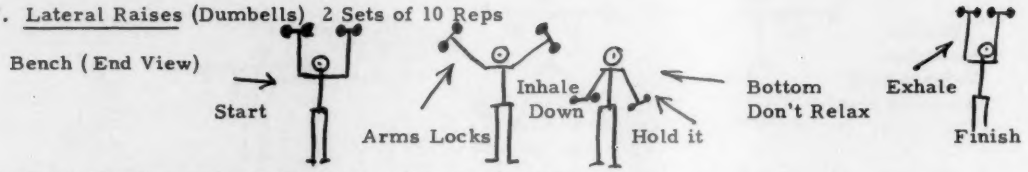
3. Curls 2 Sets of 10 Reps

4. Deep-Knee-Bends 2 Sets of 10 Reps

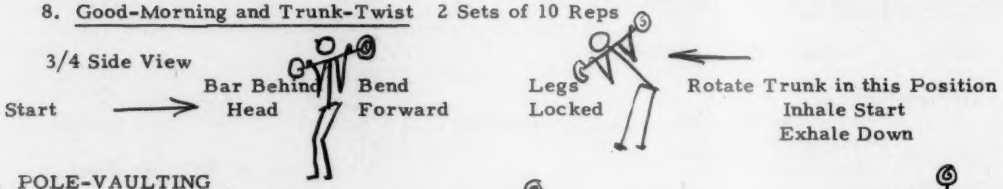
5. Bent-Arm Pull-Overs 2 Sets of 10 Reps

6. Dead-Lift (Rapid) 2 Sets of 10 Reps

7. Lateral Raises (Dumbells) 2 Sets of 10 Reps



8. Good-Morning and Trunk-Twist 2 Sets of 10 Reps



D. POLE-VAULTING

1. Warm-Up 1 Set 10 Reps

2. Press 5 Sets of 5 Reps

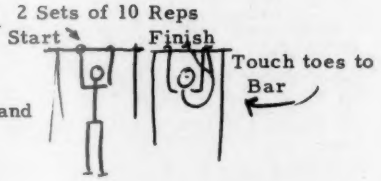
3. Curls 2 Sets of 10 Reps

4. Deep-Knee Bend 2 Sets of 10 Reps

5. Bent-Arm Pullovers 2 Sets of 10 Reps

6. Incline Bench Presses 2 Sets of 10 Reps

7. All Types of Horizontal Bar Work especially Leg Raises 2 Sets of 10 Reps



8. One-Hand-Dead Lifts Dumbell 2 Sets of 10 Reps each hand

E. HIGH JUMP AND BROAD JUMP

1. Warm-Up 1 Set of 10 Reps

2. Deep-Knee Bends - Jumping 2 Sets of 10 Reps

3. One-Hand Dead-Lifts (Dumbell) 2 Sets of 10 Reps each hand

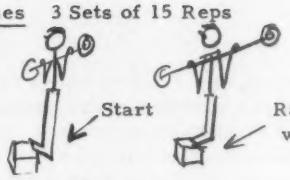
4. Leg Lunges 2 Sets of 10 Reps

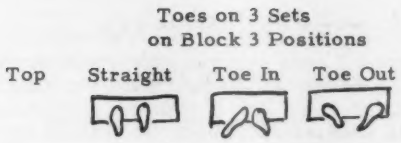
5. Press 2 Sets of 7 Reps

6. Pullovers 2 Sets of 10 Reps

DON CANHAM

7. Toe-Raises 3 Sets of 15 Reps



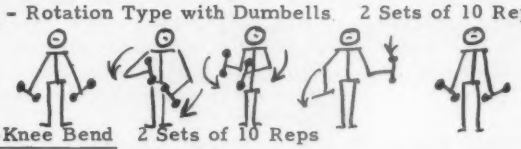


8. Sit-Ups and Leg Raises

F. JAVELIN

1. Warm-Up

2. Curls - Rotation Type with Dumbells 2 Sets of 10 Reps

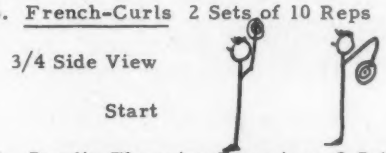


3. Deep-Knee Bend 2 Sets of 10 Reps

4. Pull-Overs 3 Sets of 10 Reps -2 Sets Straight Arm -1 Set Bent

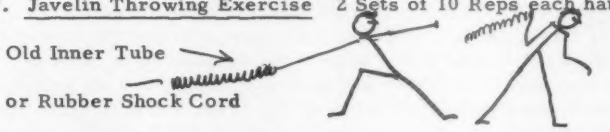
5. Toe-Raises 3 Sets of 10 Reps

6. French-Curls 2 Sets of 10 Reps



Lower Bar behind Head
Bend Arm Full - Keep Elbows
High Along Side of Ears

7. Javelin Throwing Exercise 2 Sets of 10 Reps each hand



Use Arm, Legs and Back
Against Rubber Shock Cord
Attached to Old or Broken Javelin

8. Sit-Ups and Leg Raises

G. SPRINTING

1. Warm-Up 1 Set of 10 Reps

2. Press 3 Sets of 5 Reps

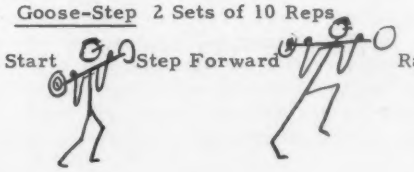
3. Two-Hands Snatch 3 Sets of 10 Reps

4. Leg Lunges 2 Sets of 10 Reps

5. Dead-Lifts -One Hand (Rapid) Dumbell

6. Toe-Raises 3 Sets of 10 Reps

7. Goose-Step 2 Sets of 10 Reps

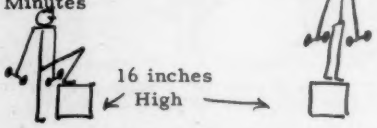


DON CANHAM.

H. DISTANCE RUNNING

1. Warm-Up 1 Set 10 Reps
2. Curls 2 Sets of 10 Reps
3. Leg Lunges 2 Sets of 10 Reps
4. Pull-Overs 2 Sets of 10 Reps
5. Dead-Lift and Shoulder Shrug 2 Sets of 10 Reps
6. Goose-Step 2 Sets of 10 Reps
7. Sit-Ups Leg Raises 100 Reps or More No Weight Rapid
8. Step-Test 3 and 5 Minutes

15 Lb.
Dumbell
Each Hand



Step up same foot for 2/3 of time of test then allow student to change feet

Immediately following exercise of 3 or 5 minutes have student hold breath. When he can hold 30 seconds after 3 min. he will have developed good oxygen debt 20 sec. after 5 min.

The use of weights in the off-season training period will greatly improve a boy's performance as well as prevent costly injuries during the season.

PHYSIOLOGICAL CONSIDERATIONS OF PACE IN RUNNING MIDDLE DISTANCE RACES

By: Sid Robinson
Indiana University

The maximal speed at which a man can run a given middle distance race depends upon the rate at which he can put energy into the race and upon the efficiency or economy with which he uses the energy in running the race. The energy of muscular work is derived from two kinds of chemical reactions in the muscles: (1) those which require oxygen which must be taken in during the race and (2) those which are anaerobic. In running a race, energy is being simultaneously released by both types of reactions and the runner should finish the race having made maximal use of all of these chemical sources of energy.

Reactions of the first type make use of the oxygen which the runner consumes during the race for energy released by oxidation of fuels such as muscle glycogen. Obviously this process must take place at a maximal rate in exhausting exercise. The amount of energy available from current oxidations during a run is limited by the maximal rate of oxygen transported by the blood to the muscles and its utilization by the muscles. The ability of the heart to pump large volumes of blood through the working muscles is the principal limiting factor here. Since the maximal rate of oxygen consumption for a given runner is fixed, the total amount of oxygen which he can consume in an exhausting run is proportional to the time and therefore to the distance of the run.

Even in the most highly trained athlete the oxygen which he can consume during a fast middle distance run is not adequate for the great amount of energy he must expend to carry the pace. It is supplemented, then, by energy derived from what we call anaerobic chemical reactions which take place in the muscles during the race. These reactions do not require oxygen at the time they occur. The initial anaerobic reactions in muscular contraction are reversed by energy from subsequent anaerobic reactions and extra oxygen must be consumed during recovery to provide energy for completing the rebuilding of all the high energy molecules. The net energy which the runner has borrowed from anaerobic sources during a race is proportional to his "oxygen debt" or the amount of extra oxygen he consumes during recovery above his usual resting oxygen consumption.

The amount of the oxygen debt may not exceed 15 to 20 liters and if the runner extends himself fully it will be about the same regardless of the distance of the run in races from one-fourth mile to six miles. The utilization of the oxygen debt to the fullest extent depends upon the runner's willingness to extend himself, principally during the latter half of the race. His tolerance for a maximal oxygen debt depends upon his tolerance for lactic acid which accumulates in his muscles and diffuses into his blood stream during the run. Lactic acid is the most prominent product of anaerobic muscle metabolism during a hard run. It is the result of the anaerobic breakdown of muscle glycogen. During recovery after a run, about one-fifth of the lactic acid accumulated is oxidized to provide energy for resynthesis of the other four-fifths of the lactic acid to glycogen. During a race when the lactic acid reaches a physiologically high concentration in the muscles, they become fatigued; there is a decrease in their contractile power and the speed of running is reduced.

Since for an individual runner the available oxygen debt would be about the same for any race from a quarter-mile to six miles, the relative importance of the oxygen debt as a source of energy decreases with the increasing distance of the race. For example, during a quarter-mile race the short time would limit oxygen consumption during the run to less than three liters and yet he could acquire an 18-liter oxygen debt; during a mile run lasting 4 minutes a runner could consume a total of 18 to 20 liters of oxygen and acquire an oxygen debt of about the same magnitude; in a 2-mile race lasting 9 minutes the same man would consume more than 40 liters of oxygen and yet could utilize only his maximal oxygen debt of 18 liters.

The total energy which a man puts into a race is proportional to the sum of his total oxygen intake during the run plus the oxygen debt incurred. This is true because even the anaerobic reactions which have released energy during a run must ultimately be balanced by energy from oxidations occurring during the run and recovery. The sum of the oxygen intake during a run plus the oxygen debt was called the "oxygen requirement" of the run by A. V. Hill. The total oxygen requirement divided by the time of the run in minutes is the oxygen requirement per minute. The relationships of the oxygen intake, oxygen debt and the oxygen requirement of Don Lash in a 4-minute run to exhaustion on the treadmill are shown in figure 1. Since the speed was constant, the average oxygen requirement per minute was plotted as if energy expenditure were uniform throughout the run. This is not a true representation since we now know

that in an exhausting run at constant speed, the energy cost varies greatly at different times during the run.

Since for a given race a runner's available energy is definitely limited, his success depends also upon the economy or efficiency with which he expends the energy. Efficiency depends upon good form or muscular coordination which can be improved by training. A. V. Hill[1] found that a runner's energy or oxygen requirement per minute for running at different speeds increases as the 3.8th power of the speed. From these data, Hill concluded that the most efficient way to run a race would be to run at an even pace throughout, because any part of the race run faster than the average speed would require more extra energy than could be saved in another part of the run at a correspondingly slower rate.

The present author, Robinson[2], suggested that fatigue associated with high concentrations of lactic acid in a runner's muscles not only reduces the power of the muscles and slows him down but it may also reduce the efficiency of running. In other words, fatigue with a high concentration of lactate in the muscles may increase the energy cost of running at a given speed. If this is true, then we must consider the development of fatigue in the runner as he progresses through the race before deciding upon the optimal pace he should run at different stages of the race. Hill's data showing that the oxygen requirement for running increases as the 3.8th power of the speed were obtained in short runs by unfatigued subjects, and his conclusion that for best performance a runner should run at a uniform pace throughout the race did not take fatigue into account. Some athletes and coaches believe it best to run a fairly uniform pace in a race, but most men run the first part of the race considerably faster than the average speed for the whole race. The choice of pace to be followed at different stages of the race may be dependent upon the strategy required for position in the race and the speed of the particular runner on the finish. In the final analysis the athlete must take into account his own characteristic abilities, the character of his opponents and the strategy and position required, but he should not ignore the purely physiological considerations.

In recent treadmill experiments on a good runner we have found that the energy cost of running is greatly increased by fatigue in the late stages of an exhausting run. We chose a speed (14 mph) which would exhaust the man in 2.5 to 3 minutes. The runner was in good condition and had several practice sessions on the treadmill to get accustomed to running on the machine and to the various manipulations of the experiments. Each of 3 experiments included determinations of (1) the subject's resting oxygen consumption and blood lactic acid concentration before a run on the treadmill, (2) his oxygen consumption for each minute of a run at 14 mph on the treadmill and the lactic acid concentration in a blood sample collected at the end of the run, and (3) his oxygen debt during recovery after the run and lactic acid in another sample of blood taken 2 hours after the run. In the first of the 3 experiments he ran for exactly one minute, the next day he ran exactly 2 minutes in the second experiment, and on another day he ran to exhaustion in 2 minutes and 35 seconds in the third experiment. Complete observations as listed above were made in each of the experiments. Great care was taken to operate the treadmill constantly at exactly the same rate (14 mph) in all experiments. The speed was set carefully with a stopwatch before each run and timed repeatedly during the experiment.

From the data of these three experiments, calculations were made of oxygen intake, oxygen debt, total oxygen requirement and blood lactic acid for the first minute, the second minute, and for the last 35 seconds of the exhausting run of 2 minutes and 35 seconds. Figure 2 presents the results of the experiments. The oxygen requirement was 8.1 liters for the first minute of the run, 7.5 liters for the second minute and 7.1 liters or 12.2 liters/minute for the last 35 seconds. Thus the energy cost of running at constant speed was smaller in the middle part of the run than in the first of it and increased greatly as he became fatigued in the last half minute. Associated with these changes in efficiency were increments of lactic acid of 52.7 mg.% in the first minute, 40.mg% in the second minute and 44 mg% or 70 mg.% in the last 35 seconds. The high concentration (144 mg.%) of lactate at the end of the exhausting run was associated with the great increase in the energy cost of running which occurred at the end. Figure 3 presents curves including extrapolations of the same data. A curve of the rate of increase in the oxygen debt is also included. The similarity of the oxygen debt and lactic acid curves is striking. If the extrapolations are correct they indicate tremendous rates of change in the subject near the end. The runner rather suddenly reached a chemical and physiological end point. We expect to continue these studies in the near future and make a more detailed analysis of the onset and progress of these changes.

(1). Hill, A. V. Muscular Movement in Man. McGraw-Hill, New York 1927.
(2). Robinson, S. Energy and Fatigue in Distance Running. Cine-Sports Library, International Sports, Inc. Indianapolis 1939.

From the data at hand we are able to make some very interesting deductions regarding the purely physiological aspects of running middle distance races. It is obvious that the runner should pace himself so as to delay until near the end of the race the sudden increase in energy cost of running associated with great fatigue and high lactic acid concentration. If the first part of a race is run too fast the runner may acquire most of his oxygen debt and be forced to run the remainder of the race with a high lactic acid, with his efficiency greatly reduced, and at a much slower pace. The fact that he is expending energy too rapidly during the period before the oxygen intake reaches its maximum contributes to this. This physiological fatigue occurring too early in a race would also tend to discourage the runner throughout most of the race.

What then is the best pace to follow through a race in order to achieve maximal performance? Strategy and position in competitive races and individual differences among runners are obviously important. However, from a purely physiological point of view the evidence indicates that the first 220 yards of a mile run should be a little slower than the average speed, a uniform pace at about the average speed should then be run until the last quarter which should be run all out in order to make sure that the maximal oxygen debt is utilized. For instance, a 4-minute mile might be run most easily by running the first 220 yards in 31 seconds, the next six at a 30 second pace and the 8th 220 yards in 29 seconds. A 62 second first quarter with the last quarter in 58 seconds might prove to be an even better combination. The slower start would not expend anaerobic energy so rapidly before the runner's oxygen intake had risen to the maximum and thus would delay the onset of handicapping fatigue. The oxygen intake would be maximal during the middle part of the race, thus supplying currently a large proportion of the energy expenditure. Such a pace would not seriously deviate from the even pace which Hill recommended on the basis of his oxygen requirement curve on unfatigued subjects.

Most of the above discussion has made reference to the mile race. The physiological importance of a relatively uniform pace may be found to be even greater in 440 and 880 yard races than in the longer runs because the faster runs are at speeds falling on the steep part of the oxygen requirement curve. The effect of fatigue in reducing efficiency and speed during 440 and 880 yard races also deserves as much consideration as in the mile.

The coach should not immediately apply these ideas of pace based on physiological considerations to a man who is accustomed to a fast start in his races. Rather the coach and the runner should experiment with the ideas, first in practice and then in certain races, to determine their applicability to the individual. For psychological reasons a runner who has always used a fast start would undoubtedly find it difficult to adapt himself to a slower start and a fast finish.

Further studies are required to determine definitely the relative energy costs to a man of different distributions of pace in exhausting runs covering the same distance in the same total time. For instance, a comparison should be made between one run to exhaustion at an even pace, a second run attempting to cover the same distance in the same total time but with the first quarter fast and a correspondingly slower last quarter, and a third run with a slow start and a fast finish. These studies should be applied to a short run (440 or 880 yards) and to an intermediate one such as the mile.

* *

(Question) We took a football team from 3600 to 7200 feet elevation. We took oxygen tanks along. What do you think about it?[4] (Answer) The best thing would be to ignore it; don't even tell the boys about it. The only time oxygen would do them any good is if they could take it out on the field with them. Oxygen doesn't store. Taken in recovery periods it doesn't do any good. The only effects are psychological.

(Question) How about the psychological effect of running the first half faster than the second? (Answer) It is natural for a runner to run faster while he feels fresh. Most runners take it easy, then sprint.

(Question) How does this apply to the quarter mile when the tendency is to run the first part of the race considerably faster? (Answer) I still think these ideas are worth trying. A smart coach can't afford to ignore them. Don't forget that in the ordinary 440 race there is a sprint for position and jockeying but when the race is run in lanes, it should be tried.

(From the floor) Lea ran his :45.8 by running 22.9 and 22.9. (Answer) I wondered about that fast race in Mexico. I wonder if the altitude wasn't in the runner's favor. Remember the whole quarter is run almost entirely on oxygen debt so the intake is practically nothing. In that case there would be an advantage in less air resistance. Altitude makes a great difference in the longer races. It imposes definite limitations.

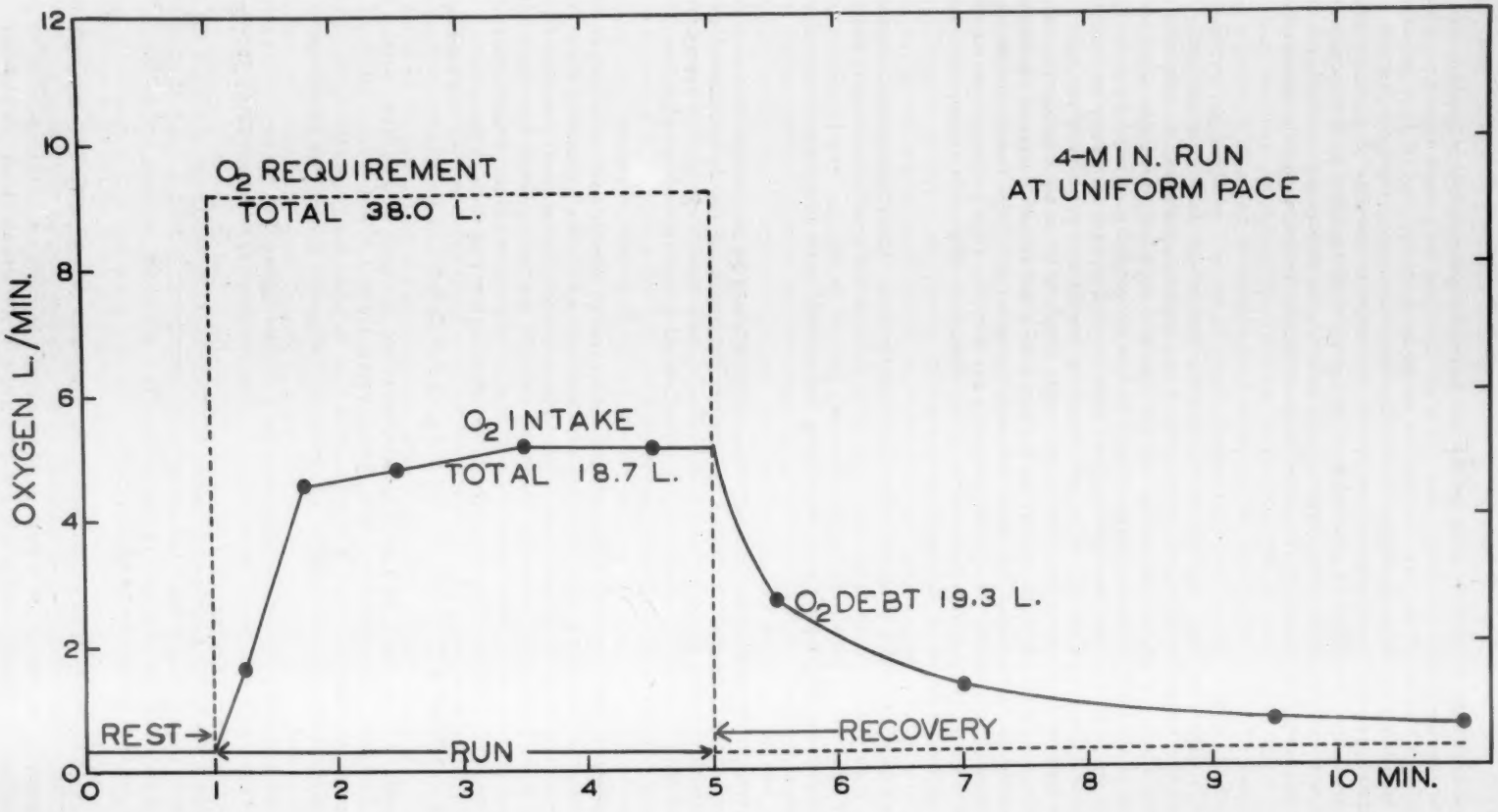


Figure 1. The O_2 intake, O_2 debt and O_2 requirement of a man in a 4-minute run to exhaustion on the treadmill. O_2 requirement/minute was not determined for each minute separately and is plotted here as the average for the 4 minutes.

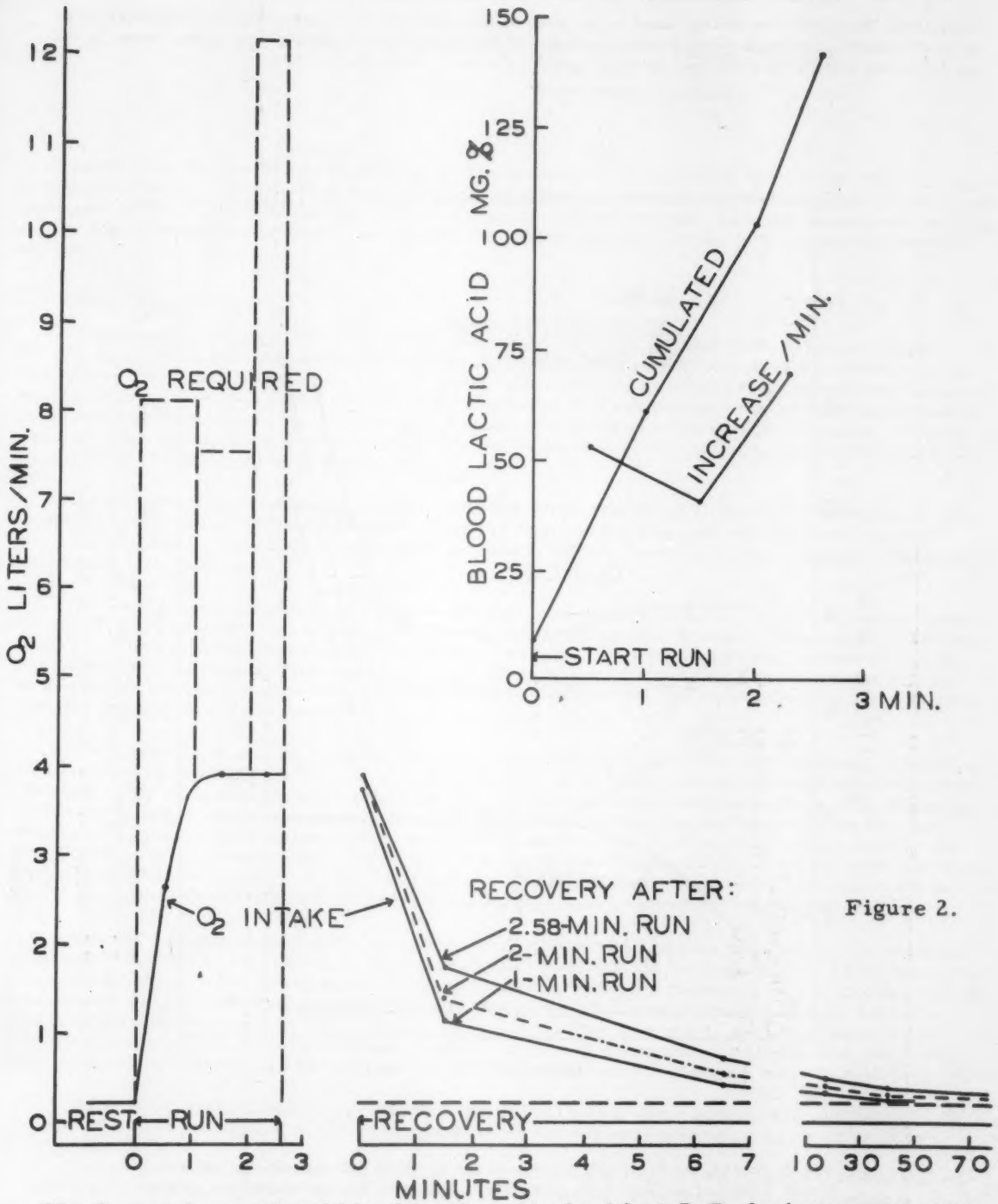


Figure 2.

The 0_2 requirement and blood lactic acid of subject J. T. during a run on the treadmill at constant speed (14 mph) leading to exhaustion in 2 minutes and 35 seconds. Note the great increase in 0_2 requirement in liters/minute and the rapid increase of lactic acid which occurred in the last 35 seconds.

(Question) How about the energy used in the start of the quarter? (Answer) Accelerating costs disproportionately. There is more energy expended at the beginning than in any part of the race. Again, tactics make a difference but that wouldn't apply if the race were run in lanes.

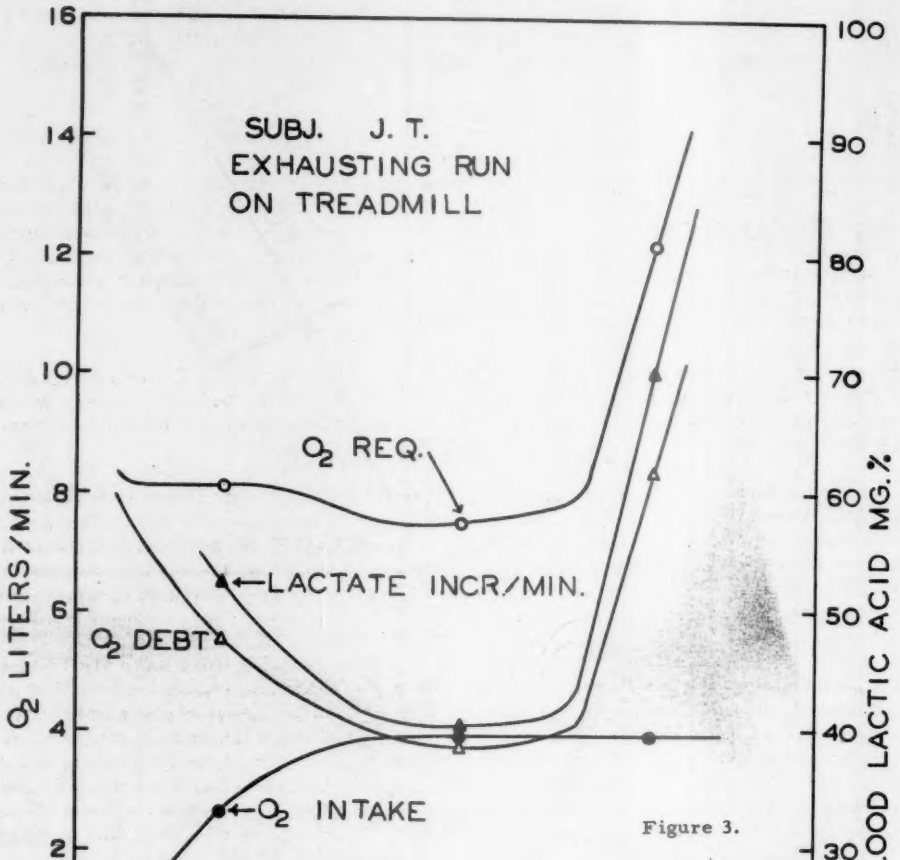


Figure 3.

The 0_2 intake, the 0_2 requirement and the rates of increase in 0_2 debt and blood lactate of subject J. T. at different stages of an exhausting run on the treadmill.

SOME PHYSIOLOGICAL COMPONENTS OF MODERN TRACK TRAINING

By Ernst Jokl, M. D.
University of Kentucky

I intend to discuss three physiological problems which are of relevance to coaching, viz., the significance of the Finnish Sauna bath in the training for long distance running; the dominant part played by the upper extremities in the initiation and control of complex body movements, including running and jumping; and the need to extend the concept of coordinative skill from the neuro-motor to the autonomic nervous system.

Heat Regulation

The question has repeatedly been asked whether Finnish long distance runners apply methods of training which differ from those followed elsewhere. It seems reasonable to answer this question in the affirmative. The fact that Finland - a small nation - produces large numbers of outstanding 5000m, steepl steeplechase and marathon runners is due to the application of a combination of procedures which lead to a singularly effective state of adaptation to the stressof long distance - including ski - running. By contrast, no valid explanation has yet been given why the United States, the leading track and field power in the world, is so weak in the long distances.

I have come to the conclusion that the traditional Sauna bath which all Finnish - and scarcely any American - runners use regularly, combined with the rigors of the long and cold winters to which the Finns are exposed on account of the geographical position of their country is a highly significant adjunct to their athletic training.

At the 1924 Olympic Games in Paris, a 10000m cross country team race was held on an exceptionally hot day. Two thirds of the participants became acutely incapacitated, many collapsing from heat exhaustion. It was the most catastrophic event in the history of long distance running. Nurmi and Ritola won the first two places. Finland was also victorious in the team competition. The fact that the Finns had previously been known to be very good long distance runners does by no means explain why they were also able to display such an extraordinary heat resistance.

The runners who gave up at the Paris cross country race presented the same symptoms which I have observed in physiological laboratory tests on the effects of extreme environmental heat on physical efficiency. In a study with Weiner[1], we used a heat chamber in which room temperature, air movement and moisture content can be regulated. Many healthy individuals when exposed to great heat for a few minutes or longer vomit or become disorientated, are unable to read the time or give their names, are "out-on-their-feet". Subsequently, they often cannot recall what happened until revived by rest and cooling down. Some collapse outright. Rectal temperatures of over 102 degrees and heart rates above 150 per minute are frequently encountered. Corresponding findings were reported by Bean and Eichna[2].

The same symptoms may occur in subjects who, disregarding the rule that gradual adjustment to temperature extremes is necessary, expose themselves suddenly to the full rigors of the Sauna bath; or in unacclimatized workers who without previous preparation, engage in deep level mining operations in the hot shafts as I had an opportunity to observe in South Africa[3]. Extreme and sudden fatigue, headache, dizziness if erect, shortness of breath, nausea and vomiting have been noted. Objective signs include flushing of face and neck, rapid pulse rates, clumsy, stumbling movements, staring glazed eyes, apathy, poor judgment, irritability, as well as fever of 102 degrees and above. Collapse is not unusual (Fig. 1).

Table 1 indicates the frequency with which such disturbances occur in untrained volunteers in the heat chamber, and the rapidity of adjustment to the stress of exposure accompanying "heat-training".

The extent of the physiological adjustment to environmental heat is still more impressive if acclimatization to the strain of severe physical exertion is studied (Fig. 2). The training adjustment is reflected in an improvement in the general physical condition of the subjects, as well as in their physical efficiency.

The corresponding opposite to the evidence pertaining to relationship of the acquisition of heat resistance and physical endurance is that of the favorable influence exerted by adaptation to cold upon the results of athletic training. With Karvonen, Kihlberg, Koskela and Noro[4], I have recently analyzed the

entire case material from the participants in the 1952 Olympic Games. One of the questions which could thus be answered was that of the proportionate representation among the athletes and among the successful competition of the four temperature zones of the world (Fig. 3). When we calculated point aggregates per million inhabitants, an absolute and relative efficiency superiority of the participants from the cold and a highly significant performance decline in the direction of the warm and hot regions of the world became apparent. (Table 1). What possibilities the atomic age will open up for the very cold regions (marked in white in Fig. 3) is a fascinating subject for speculation. It includes large parts of Canada and Russia.

Physiologically, the points of least resistance which determine physical reactions to heat and cold, or physical efficiency in hot or cold environment, are of a "cybernetic" kind, i. e., they concern the body's steering mechanisms of heat production and of heat dissipation, and of the circulatory control of blood pressure and blood distribution. Though primarily perfected through adjustment to temperature extremes, these mechanisms, once they are fully operative, add to the long distance runner's performance capacity.

With the adjustment to environmental temperature extremes is associated a feeling of well being which is reflected in the pleasant social atmosphere that distinguishes the Finnish Sauna as a family and civic institution.

The issue under discussion is not merely that of exercise tolerance in heat and cold, important though it is. What I wish to convey rather is that our customary pattern of practicing for long distance running, even if it is "modernized" by the inclusion of interval training, fails to improve the heat regulation mechanism of the body. To do so additional measures must be adopted.

The Sauna bath with its dry and steam heat rooms as well as contrast exposure to ice water or snow must be used for several months, twice weekly, before its benefits become effective in terms of performance improvement which will become evident irrespective of whether the athletes compete under moderate or under hot or cold weather conditions. At the same time, there is no doubt that the physiological adaptation of the body's temperature regulation mechanism will prove of considerable value for physical activity performed in extreme climatic circumstances.

It is suggested that track and field clubs throughout the United States construct Sauna baths and that the experiences made in Finland be carefully and systematically applied in teaching athletes in their use. I predict that the introduction in this country of the Sauna bath will lead to a significant performance improvement in long distance running.

Initiation, Control and Effectiveness of Motor Performances

The second issue with which I like to deal today is that of the key role played within the framework of general neuro-muscular activity patterns by the arms and hands. This statement can be understood only on the basis of certain neuro-physiological information which so far has been neglected in the study of the physiology of exercise and which therefore will be briefly reviewed.

A hundred years ago, two German research workers, Hitzig and Fritsch, found that electrical stimulation of a small region of the surface of the brain, the "cortex", more particularly of the "roof of the forebrain" of animals, leads to movements of the muscles of the opposite side of the body. In 1874, Dr. Roberts Bartholow of Cincinnati, Ohio, applied electrodes to the corresponding part of a human brain, using as his subject a servant of his household who had cancer of the scalp. He noted muscular contractions of the limbs of the opposite side of the body. Seven years later, in 1881, Dr. Goltz of Strassburg demonstrated at the International Medical Congress in London a dog on which almost the entire top layer of the brain including the "roof of the forebrain" had been removed by surgery. Thus, the cerebral region from which Hitzig and Fritsch had elicited body movements through electrical stimulation was missing. But Goltz's dog was able to stand and to walk and to eat. The question arose as to the mechanism by which this animal effected such motor control as was in evidence. It is now known that the brain is capable of initiating and coordinating movements from different "levels" and that each level contributes an innervation pattern of its own. The top level with its cortical motor field is involved in deliberate, detailed, consciously supervised, highly differentiated and delicate movements, in the movements that require special cultivation and education, like writing and the crafts and the playing of musical instruments and the acquisition of athletic technique

The ability to carry out an inexhaustible variety of imagined movements is largely vested into the cerebral cortex. It represents a specific characteristic of the human species. "The roof of the forebrain", Sherrington[5] says, "is in man so educable as to be practicably a new thing in the world." "Man," said Francis Galton, "is the educable animal." The most educable part of the body - disregarding for the moment the motor components of vision and speech - are the arms and hands. The fact that training

eventually renders the execution of cortically initiated "educated" motor activities "automatic" and thus removes them from detailed conscious supervision is a separate issue though an issue of great importance.

"Sub-cortical" motor patterns, such as standing and walking and running that were retained in Goltz's dog are "inborn". They may not be in evidence in very young individuals but they establish themselves during growth. The human species shares them with animals. The child need not be taught to stand and to walk and to run though most mothers erroneously think so. In contrast to what applies to animals, man can exert a far reaching influence upon "sub-cortically" directed movements. It is this relationship between conscious cortical control of the motor act and the sub-cortical direction of "complex" mass movements which is involved in the perfection of track and field performances.

Another neuro-physiological problem has a special bearing upon athletics, namely, the relationship between the ideatory aspect of a movement and the "switch over" to its neuro-motor activation. Sherrington, in referring to this issue, stressed what he termed "the duality of phenomena with which the student of mental events is confronted". One aspect of mind, he pointed out, can be inferred from movements, a fact which he considered so basic that he wrote "movement is the cradle of recognizable mind". But there is, he pointed out, a second facet of mind which is not communicable through speech or gesture or other forms of muscular activity and which remains the sole property of the individual.

By virtue of its structural and functional make-up, the different muscular regions of the body are unevenly represented on the top level of the central nervous system of man (Fig. 4). Electrophysiological studies on the human cortex, painstakingly conducted by neuro-surgeons during the past 25 years or so, have revealed a distribution pattern according to which the upper extremities in terms of their cortical representation are much more dominant than are trunk and legs. Of the upper extremities the hands, and of the hands the thumbs are over-emphasized. The same disproportionate pattern of representation is repeated on that part of the cortex - adjoining the motor control area - which serves the reception of sensory stimuli from the musculature of the body (Fig. 5). The fact that the muscles are not only a kinetic executive but also a sense organ is often overlooked.

With arms and hands differentiated movements can be carried out much more efficiently than with trunk and legs. Furthermore, the hands are endowed with sensory receptors infinitely more capable of communicating sensory details such as touch, temperature, vibration, pain and graduations of muscular contraction than are any other parts of the body.

The late Professor Rudolf Magnus[6] in Utrecht showed in a series of classical experiments that positioning of trunk and limbs and postural shifts of the top end of the body, of neck shoulders, arms and hands, initiate, control and steer many complex postures and movements, among them walking and running. These controlling and steering effects are brought about through a complicated cerebral reflex system the main part of which is situated in the brain stem.

The trigger function of the movements of the upper extremities reaches beyond the neuro-motor system. Inclusion of arm work in generalized body activity increases maximal intake far beyond what is predictable on account of the energy expenditure thus added. This point was clarified in a laboratory investigation on exercise by Astrand[7] and in a study of skiing by Christensen and Hogberg[8]. The latter authors found that the use of ski sticks increases maximal oxygen consumption very much above the intake level measured during ski running without the use of sticks. That the extension of the maximal oxygen intake capacity is a significant determinator of record performances was first demonstrated in 1937 by Dill, Robinson and Edward[9].

An entirely new picture evolves for the coach. The acquisition of maximal strength and power and of motor control of upper extremities and neck assumes an importance hitherto not sufficiently appreciated. The complex flexion and extension pattern in hips, knees, feet and toes, on which running and jumping is based can be triggered off most effectively from the upper extremities. The latter again are - to a considerable extent - determined by the way in which sensory and motor resources of hands and fingers are utilized.

Training of grip strength which in turn is related to total arm strength ought to play a much more important role in the exercise program for track and field athletes, not only for throwers and pole vaulters but also for runners, hurdlers and jumpers. Apparatus gymnastics, calisthenics, weight lifting, and wrestling but also the need for progressive differentiation of the sensory receptivity of arms and hands must be kept in mind as adjuncts of track training. Thus, even arts and crafts and music are potentially important - though hitherto untapped - resources of training. Empirical information, though available at present only in rather crude form, shows that grip strength has a high relationship to general body strength.

(Phillips[10]). However, the subject under review is extremely subtle and its neuro-physiological implications more far-reaching than has so far been realized.

Autonomic Skill

Skill is one of the three basic components of an athletic performance, the other two being strength and endurance. In the forties of the last century the great French neuro-physiologist Duchenne laid the foundations to our present knowledge of the mechanisms underlying skilled activities. The first to stimulate muscles with electric current, Duchenne discovered that movements invariably involve contraction and relaxation of a multitude of muscles, never merely of individual muscles. It is the envisaged "gestalt" of the intended movement which determines the pattern of muscular innervation employed for its realization.

Fifty years later, the brilliant British clinician, Hughling Jackson, on the basis of studies of certain forms of epilepsy, arrived at the conclusion that the human brain in directing muscular acts is equally concerned with motor aims and not with individual muscles. Human movements are initiated with a view to the successful completion of a given task. In order to do so, a variety of muscles is employed and their combination changes from individual to individual, and in the same individual from task to task. The way in which the muscles are put into action, the economy of their employment, the grading of strength engendered by their contraction, the direction of and the interplay with the forces of gravity, and the degree of relaxation accompanying, interfering with or facilitating the attainment of the objective, all these physiological elements determine the quality of the motor act as we eventually observe it. The above events take place outside the sphere of our conscious appreciation; they are components of motor skill and thus - to a large extent - of athletic performances. Though they are initiated with deliberation, they are carried out by self-regulating mechanisms that form part of the reflex machinery of our nervous system.

It is only recently that evidence has accumulated to show that the concept of skill applies not only to the neuro-muscular but also to the autonomic system. Blood circulation, respiration, temperature regulation, oxygen and energy metabolism and other "automatically" controlled functions are integrated among each other and collectively with the activities of the neuro-motor system. The common integrating denominator is represented by the object of the muscular performance, i. e., by an idea.

Much of the scientific evidence from which a more definite picture of the above inter-relationship has emerged is of a clinical nature.

First, several outstanding tennis players, among them two members of United States Davis Cup Teams are afflicted with diabetes. It had previously been known that physical training exerts a beneficial influence on the state of fitness of diabetics as is reflected in a reduction in their insulin requirements. However, that the process of compensation can be so complete as to enable "patients" to excel in tennis tournaments is of far reaching practical and theoretical implication.

A second category of clinical observations that are relevant in this context pertains to champion athletes with cardiac disease. The issue was raised in a publication in 1940[11], when a case history was presented of one of the greatest marathon runners in the British Empire with a combined valvular defect of the heart, affecting both the aortic and the mitral valves. When the athlete was seen for the first time the disease which had given rise to his condition (rheumatic fever) had come to a standstill. However, the structural ravages wrought in the past by the pathological process proved irreversible. That this man should have been able to become one of the world's leading long distance runners again indicates extent and nature of functional compensation within the autonomic system.

A third instance illustrating the point under discussion was communicated in the report of the British Everest Expedition of 1953 by Sir John Hunt[12]. Griffith Pugh and Micheal Ward, the two medical members of the team, investigated during the ascent the adaptive changes in the number and concentration of the red cells of the blood which contain the oxygen-carrying pigment, hemoglobin. In 1871, Viault had discovered that these elements increase with adaptation to high altitude. Similarly, normal and at times elevated figures had been found in first class athletes with training[13]. Pugh and Ward described that some members of the team had relatively low hemoglobin levels though their physical performances at high altitude were of course quite above the norm. Once more, a physiological deficiency, namely a low blood count, did not stand in the way of full adaptation to very high altitudes as well as to the completion of one of the most triumphal achievements in the history of sport.

Examples proving the same point could be adduced from physiological experiences: that track and field and other athletic performances are synthesized, so to speak, from very different and at times

heterogeneous components; that it is simply not true to generalize, e.g., to allege that successful marathon runners are small and thin and over thirty; that every good sprinter is muscular and under nineteen; that 1500m swimmers invariably have large hearts; or that systolic blood pressure readings of 120 mm mercury and below are prerequisites for good mountaineering. It is, to be sure, of considerable relevance that such trends have actually been revealed by statistical analyses of research data from large numbers of athletes who have excelled in the sports to which reference was made. But studying the numerous exceptions from these rules within the range of the norm as well as from clinical experience has taught us two things. First, that the organism if challenged displays a distinct trend towards integration of a variety of partial functions to a "total" act and that it always makes an effort to perform and, if subjected to training, to perform well. The individual will eventually approach mastery of the task with which he was originally confronted. Secondly, the inescapable conclusion for the coach, namely that even the most highly specialized athletic performances are built up from a multitude of physiological elements, each of which must be cultivated by the inclusion in the training curriculum of a systematically selected variety of activities. The reference earlier in this talk to the Finnish Sauna and the significance from the point of view of the performance build-up for long distance running of perfecting the heat regulating mechanism of the body is an appropriate example. The same physiological principle is involved in the proven benefits that accrue to runners and hurdlers and throwers and jumpers from the inclusion in their training of weight lifting, or to long distance men of repeated sprints; namely, the principle of integrating a total performance from seemingly heterogeneous elements. I know that a number of athletes claim to have done well without adhering to such procedures but they are certainly exceptional and even if correctly reported their experiences would only serve to show that we have not by far reached the limitations of track and field performances.

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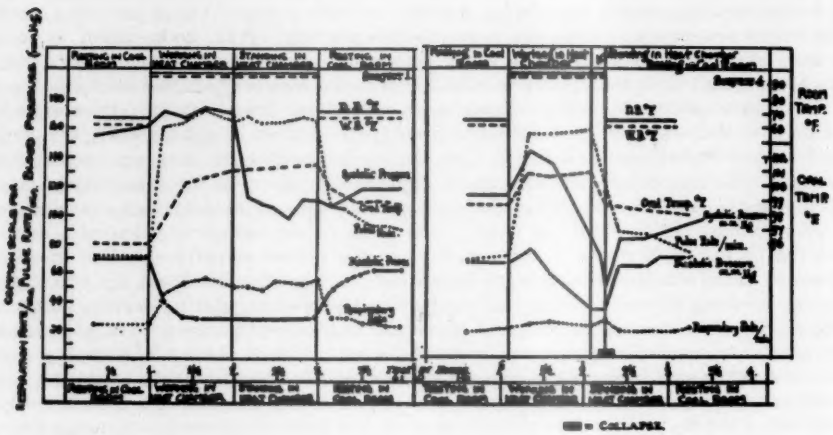
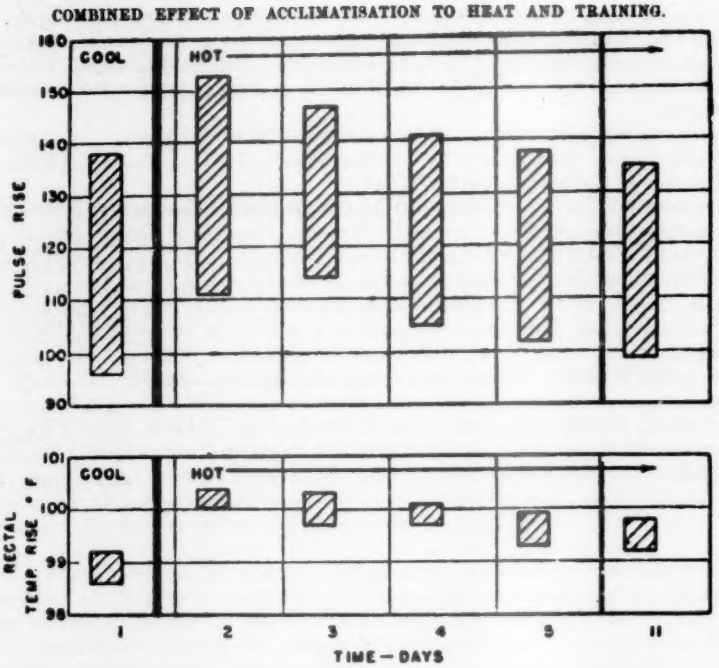


Fig. 1.

COMBINED EFFECT OF ACCLIMATISATION TO HEAT AND TRAINING.



EFFECT OF TEN MINUTES OF BICYCLING IN A TRAINED SUBJECT

Fig 2

Healthy young men were subjected to standard exercise tests in a room in which temperature was maintained at 120° F., with a relative humidity ranging from 15–22 per cent. The effect upon pulse rate and rectal temperature at the beginning of the experiments as well as after the exercise periods was measured within eleven days. A considerable degree of acclimatisation was attained, the extent and nature of which appears from the above graph. *From Bean and Eichna.*

EXPLANATION OF DIAGRAMS

Fig. 1 Comparison of two experiments made on volunteer subjects working in heat chamber. In both cases respiratory rates, systolic and diastolic blood pressure, pulse rates and oral temperatures were recorded. Each experiment consisted of four phases. First, the subject was resting in a cool room. Second, he worked in the heat chamber for one hour, shoveling gravel. Thirdly, after completion of the work period he rested in the heat chamber, standing for one hour. Fourthly, he rested in a cool room.

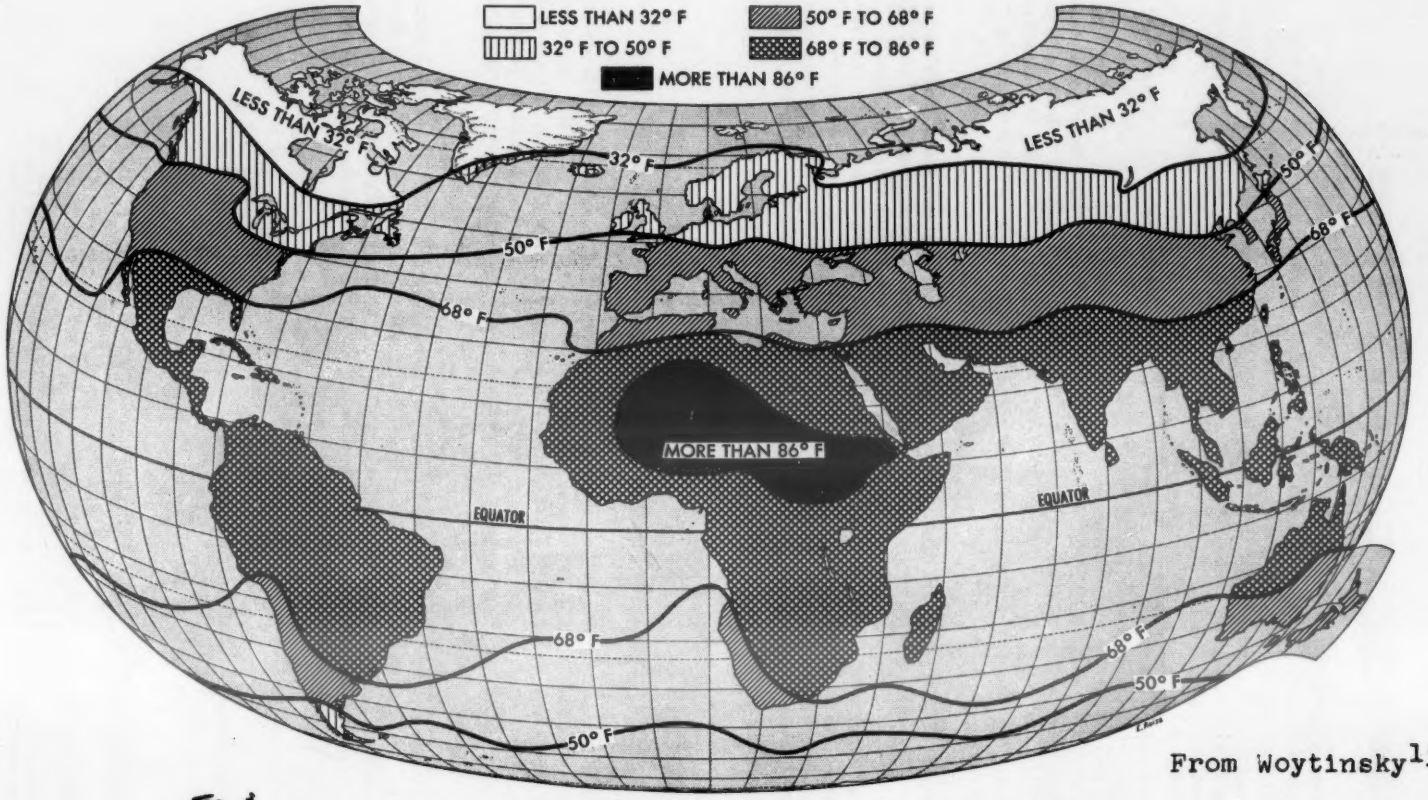
The subject whose record is shown on the left reacted to working in the heat chamber with a slight rise in systolic and a marked drop is diastolic blood pressure, both of which maintained their levels until the end of the exercise period. At the same time, pulse and respiratory rates as well as oral temperature increased. During the third period, that is, when work was discontinued but the subject remained standing in the heat chamber, systolic pressure dropped though diastolic pressure, oral temperature and pulse rate remained elevated. A complete readjustment of all physiological components took place during the fourth period, that is, while the subject rested in a cool room.

The subject whose record is shown on the right collapsed and blacked out while working in the heat chamber. As can be seen on initial rise of systolic pressure during the second phase of the experiment was followed by a sharp drop which established itself gradually during a period of about thirty minutes. It was accompanied by a drop of diastolic pressure which however was less steep than that of the systolic so that a progressive reduction of pulse pressure resulted leading to the collapse. It should be noted that pulse rate and oral temperature declined sharply prior to and during the fainting spell and that systolic blood pressure recovered quickly after the subject had rested in a cool room.

EXPLANATION OF DIAGRAMS

Fig. 4 & 5. The distinguished Canadian neuro-surgeon Wilder Penfield[16] has recently presented these diagrammatic sketches from which the extent and proportional relationship of the representation in the cerebral cortex of man of the different body regions can be grasped. He speaks of the motor and of the sensory "homunculus", a medieval term originally used in reference to a fantastic concept in alchemy, namely that of producing a small human being in the laboratory made from chemicals with the help of conjured ghosts.

Penfield's diagrams however reflect sound neuro-physiological experience leaving no doubt that speech, vision and the upper extremities, more particularly, hands and especially thumbs are markedly dominant on the "top level" of the human brain. This statement applies to the motor representation as well as to the conceptual aspect of sensory information reaching the cortex from the different muscular regions of the body.



From Woytinsky[15]

Fig. 3

CLIMATE: SELECTED ANNUAL ISOTHERMS AND TEMPERATURE ZONES IN THE WORLD

The northern annual isotherm of 32° F. is not far from the Polar Circle in the Western Hemisphere. In the Eastern, it rises far above the Polar Circle in Scandinavia and sinks in the Far East to the latitude of New England.

The northern annual isotherm of 68° F. passes close to the Tropics in the Far East and swings northward in the Western Hemisphere. The largest part of the United States is between the annual isotherms of 50° F. and 68° F. The same zone includes the countries of the Mediterranean basin, Switzerland, the Balkans, the southern part of the USSR, the Near East, and most of China, Korea and Japan. The southern zone with a similar annual temperature passes through parts of Chile, Argentina, South Africa and southern Australia.

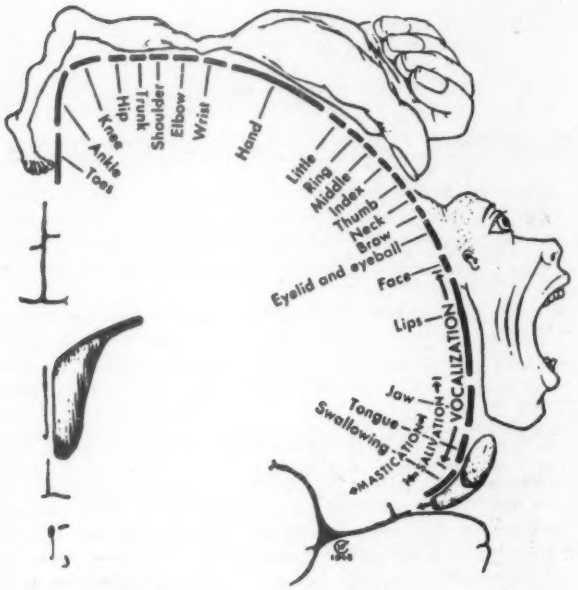


Fig. 4

Motor homunculus.

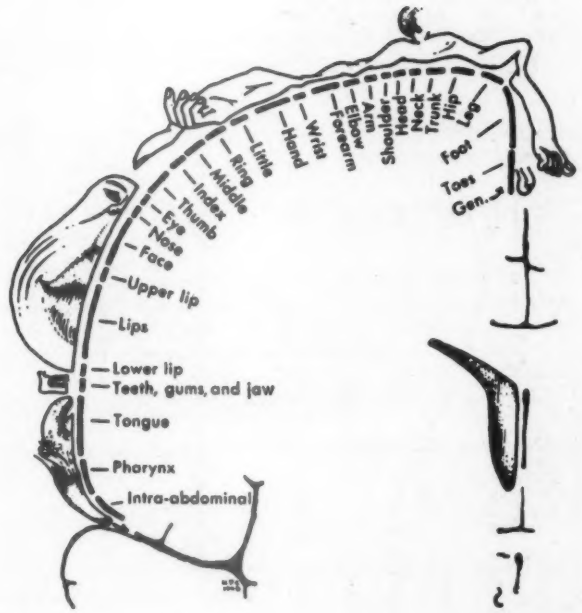


Fig. 5

Sensory homunculus.

Table 1

Olympic participation and achievement of the temperature zones[x)]

Temperature zones[x]	Population in Millions	Participations	Participations per million inhabitants	Points	Points per million inhabitants	Points per participation
Cold	312	1049	3.36	29 552	94.7	28.2
Cold & cool	246	417	1.70	14 979	60.9	35.9
Cool	401	1395	3.48	32 472	81.0	23.3
Cool & warm	495	79	0.20	2 738	5.5	34.7
Warm	866	476	0.60	7 439	8.6	15.6
Warm & hot	64	11	0.20	146	2.3	13.3

[x] Annual isotherms of temperature zones:

Cold: 0° - 10°C or 32° - 50°F

Cool: 10° - 20°C or 50° - 68°F

Warm: 20° - 30°C or 68° - 86°F

Hot: More than 30°C or 86°F

For details see: Jokl, Karvonen, Kihlberg, Koskeld and Noro, "An Olympic Survey", Helsinki, Finland, 1956

THE INFLUENCE OF EMOTIONS ON EFFICIENCY

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I. THE REASONS FOR THE CHOICE OF THE TOPIC.

(1) THE GREAT IMPORTANCE OF THE EMOTIONS IN TRAINING AND COMPETITION.

"The athlete is not only a sum of physical attributes but also a complicated combination of psychical conditions. Speed, accuracy, strength and endurance alone do not make a successful competitor. Achievement comes only with a propitious alliance of high value bodily and psychical qualities. Speed or strength is useless if not correctly applied with all one's heart in the crucial moment."

Emotions often overcome the intellect. They influence the form of the movements and deliver latent powers which are not available otherwise. The quantity depends on the motive and the intensity of feeling. "Anger, for example, often tends to make one stronger, and as anger progresses into rage, the strength of the individual reaches unexpected heights."

(2) THE IMPORTANCE OF THE COACH IN STIMULATING OR WEAKENING EMOTIONS.

The coach has a great influence on the athlete, especially the adolescent. He exercises more influence on the maturation than any other teacher, sometimes more than the parents. Therefore it is possible for him to regulate the feelings to a certain extent. He needs considerable experience. If he unwisely attempts to exert too great an influence the athlete may reject him with a negative result in performance. Contrarywise, too little influence may not have any affect on the athlete.

* A man who is not properly conditioned can not operate at maximum efficiency for the entire contest. He will be unable to complete his mission.

* Many coaches emphasize only bodily training but it is necessary to emphasize psychical training too.

* Every athlete, the champion too, sometimes needs psychical encouragement. Often an experienced athlete walks about excitedly before an important event, and is very grateful for a sedative word from his coach.

Stimulating or weakening of emotions must begin at the appropriate moment; on the other hand it is possible that the coach's effort may be in vain, or even have a negative effect.

Psychical training is not an incidental concern of the coach, but is a permanent activity according to a carefully thought out plan.

Unfortunately the topic of this paper is very rarely dealt with in the sport-literature. The coach will find little methodical instruction and must work within the limitations of intuition. He can see the influence of emotions on human posture in the work of famous artists , and can draw conclusions from them as to the influence of emotions on movement.

II. THE DIFFERENT KINDS OF PSYCHICAL CONDITIONS.

We distinguish different kinds of psychical conditions which can be classified as to strength and length.

(1) FEELINGS. - Definition of term:

Feelings are psychical conditions which are perceived - it is linguistically difficult to explain - in any way as moderately pleasant or unpleasant.

(2) EMOTION. - Definition of term:

Emotions are a stirred-up state of an organism.

It is difficult to distinguish the term feeling from emotion, because the lines of demarcation between feeling and emotion are not sharp. Feelings are less vivid, less exciting than emotions, which have - it is evident - far reaching results. There is a change in respiration, an increase in the rate of heartbeat, a rise in bloodpressure, the process of digestion is disturbed. Sometimes one is unable to think clearly about anything except the matter which has aroused the emotion.

Emotions are mostly outwardly visible. The facial expression changes, the muscles become either rigid (e.g. anger) or flaccid (e.g. fear). Some emotions have a significant posture (e.g. rage, mourning). Everyone recognizes the clenched fist and teeth as denoting fury, the trembling limbs denoting fear.

(3) ATTITUDE OF MIND. - Definition of term:

Attitude of mind is a psychical state of longer duration. The human being has a tendency to return after trouble to the basic-attitude of mind again. This tendency is a far-reaching determinant of the temperament, which is a frame of mind. A sanguine person has a preponderantly joyful, a choleric a passionate, a melancholy a dejected and a phlegmatic an indifferent attitude of mind.

III. THE EFFECT OF EMOTIONS ON PERFORMANCE.

No feeling or emotion has the same consequences for all individuals in all circumstances. Anger stirs one person up, and it makes another indifferent. Joy is a very stimulating feeling but if one is tired, it has little effect. The effect of emotions also depends upon intensity. Some feeling of moderate intensity is very useful, but an increase in intensity may become disadvantageous.

(A) EMOTIONS WITH PREPONDERANTLY ADVANTAGEOUS EFFECT.

(1) JOY.

The feeling of joy is one of the most stimulating feelings which favors movement. Children can frequently be seen to cavort about on joyous occasions. Gay dance-movements often include jumping. True sport is a joyful game of bodily exuberant strengths. The European more frequently inclines to take sport as hard work. The American is less compulsive in a contest, whether in victory or defeat. It is a responsible mission for the coach to inculcate the concept of sport as a recreation rather than a task. This does not exclude hard training and good fighting in the contest.

Joy is the best impulse for activities. The coach must not destroy this precious feeling by a bad plan of training. He must not correct the beginners too much. He must not make the work monotonous.

Joy in anticipation of the contest can ameliorate the sacrifices of training. The moment of victory brings with it the highest of pleasurable sensations, and afterwards a long lasting peaceful feeling of satisfaction in the reminiscence of the occasion.

(2) INTEREST, ENTHUSIASM.

Interest creates the basis for attention which is necessary to learn a correct movement quickly. Attention shortens the time of reaction (e.g. start). It is especially important in strategy (e.g. distance running).

Enthusiasm is a heightened interest. It mobilizes all one's energies for the goal. It is a valuable aid in training and competition.

Too much interest sometimes makes the muscles rigid, and hinders a relaxed movement (e.g. the beginner). Unrestrained enthusiasm leads to an excess of movement, and a lack of economy in work. The task of the coach is therefore to stimulate interest and enthusiasm where it is necessary, and to teach they must be kept in control when they appear in abundance.

Aids to heighten the enthusiasm are (1) animation by means of words (2) his own example (3) anecdotes about champions (4) participation in competition with the possibility of success, and so on.

(3) CONSTANT READINESS FOR ACTIVITIES.

Constant readiness is the basis of success. This readiness is especially necessary for the day-to-day practices, since for the contest other means of stimulation are available.

A boy who prefers a date with a girl or a visit to the movies to the regular training, who missed the conditioning because the weather is bad is not carved from the material which makes a great champion. Perhaps it is possible to educate him for conscientiousness with the help of the team. On the other hand he will not be a trustworthy teammate.

Often athletes are reliable who have had many disillusions in life. They will find fulfillment in sports. The coach will not be disappointed who exercises loving care in the boys' training.

(4) SELF-RESPECT.

The feeling of self-respect gives a sense of quiet and self-possession. The self-confident athlete has even in the crucial contest a perfect technic exactly as developed during practice. Scrupulous conditioning, the belief one has always done his duty, true to his coach, and fair to his competitors provides the athlete with this important positive feeling.

The coach's educative effort begins when the athlete indulges in activities which may destroy self-respect (e.g. neglect of training, extravagant life, use of unfair means in the contest). The attempt of an athlete to assume improper advantage because it is urgently needed for a contest requires a special mode of treatment. Attempts of such a kind not only destroy the self-respect of the culprit but also the morale of the whole team.

(5) SELF-CONFIDENCE, SELF-COMPLACENCY AND SELF-CONCEIT.

Between these feelings there is no sharp line of demarcation. They are integral parts of a continuum.

Generally they support the practice of sport and give movements free of contradiction. The determination to master the three important "T's", that is training, technic and tactics gives self-confidence. It makes the athlete serene in competition. It allows unhampered use of all one's powers. In general the coach shall therefore propagate this feeling.

Self-confidence creates pride. There can be no objection to that so long as it does not become arrogance. Pride in success has an effect long after the victory. It stimulates for that reason conscientious training. If the boy lacks self-confidence, the coach must attempt to engender it.

Self-complacency and self-conceit are not virtues. But in many cases they are of great value to attain perfection in sport activities. Nobody is free of conceit and this little frailty is pardonable. Nearly everyone thrills at the sight of his name in newsprint, sees with pleasure his picture there. Everyone likes congratulations and the applause of the multitude. To get these agreeable things the competitor will perhaps work on the practice field more willingly.

Conceit sometimes has sexual motives, especially in the adolescent. The boy wants to make a favorable impression upon the girls. For this purpose successful performance seems to him an appropriate means. He knows that only exact training will lead to the goal, therefore he works well to acquire fitness, and with it admiration of the girls. Girls do not always distract the boys from practice and training. On the contrary they encourage them and vicariously enjoy the thrill of victory.

The use of conceit as a stimulant must be carefully considered. Unless caution is exercised, it is possible that the athlete may become arrogant, with unbearable manners.

Self-confidence has not always a great effect. Sometimes it makes one careless. The athlete executes the details of movements in a slovenly manner. He becomes inattentive, he underrates his competitor. Many events are lost against inferior competition because the self-confident athlete is too careless. To such an athlete the defeat may be a good warning, and in addition the coach may sharply reprimand the superficial boaster. Before the next contest the coach will depict to the negligent sanguine person the excellence of his competitor in detail hoping to make him more competitive. The coach's job is not an easy one because careless self-complacency and stupidity often appear together.

The coach has many difficulties with athletes who are self-confident and extraordinarily good as long as everything goes well, but who collapse when they believe the opponent is better than they. One can watch such behavior in distance running, when a long leading runner is surprisingly passed by his opponent, loses self-confidence and gives up. The coach needs much patience with such athletes. He must prepare them psychically for the competition and call their attention to all tactical possibilities. In spite of it reactions will be unavoidable.

(6). EXCITEMENT, ANGER, RAGE.

To a certain extent excitement is favorable for the contest. But its measure is individually different. The task of the coach is to find the correct degree of excitement, because an excess consumes bodily and mental strengths without adding to performance.

*Anger accelerates the circulation of blood, delivers latent power, and makes the athlete free of restraints. It leads to an intensifying of effectiveness in a decided direction. The history of track and field shows many examples of success in the state of angry excitement. To make the athlete intentionally angry with the purpose of heightening his effectiveness is a ticklish task. Possible the athlete may progress into the emotion of rage. In this state he has indeed vast strength, but he only has the tendency to destroy. The athlete loses control over himself, his visual field is very narrow, the effect is therefore negative. But for an indifferent phlegmatic person it may be profitable to make him angry.

Sometimes the feeling of anger changes abruptly into indifference. The athlete loses the wish to continue the contest.

(7) THE FEELING OF REVENGE.

Strong feelings of revenge are a vice. But contained within the frame of a fair contest, consistent with the rules of sport, they are ethically allowable. The desire for revenge for a suffered defeat is humanly comprehensible. It is a very strong stimulation and creates effective actions. The history of sports often tells us that traditionally feelings of revenge, which sometimes affect a multitude (e.g. competitions between universities) encourage the athlete to produce exciting fights and glorious victories. Often the personal longing for revenge accelerates physical and psychical functions and creates in this way a high performance.

In stirring up revenge the coach must be cautious. He has to prevent the sort of rivalry which leads to hate and unfair actions.

(8) CONFIDENCE IN THE COACH.

Confidence in the coach is an important presupposition for successful training and competition. A coach who is an expert in track and field, who is a teacher, friend and father to his boys, who masters his own emotions will gain the unlimited confidence of his athletes. The athlete must be convinced that all orders of his coach are sound.

Confidence in the coach should not be destroyed by outsiders. Also the so-called training camps have not always the desired success. Sure, the coach there is an expert, but he has perhaps a different method, because various paths can lead to the same goal. The experienced, matured champion will know this, but there are people who begin to doubt the abilities of their coach.

(9) SOCIAL FEELINGS.

To this category belong all feelings which urge one to expend all his strengths for the group. They are a necessity for outstanding teamwork and often create admirable effects. Education for a spirit of good team work is a primary task of the coach.

(B) EMOTIONS WITH PREPONDERANTLY NEGATIVE EFFECTS,

(1) ANGUISH, FEAR.

(a) FEAR OF OBSCURITY.

This is a feeling which is often underrated in importance. Many athletes have a sense of uneasiness on unknown playgrounds, in strange environment, especially in foreign countries. Unaccustomed lighting at night-meetings makes anxiety too. Insecurity in feelings makes unsteady movements and so diminishes effectiveness. The task of the coach is to acquaint his athletes with all new arrangements before the event. He will show them the condition of the track and field, the quality of artificial lighting, especially for jumping and hurdles, he will tell them about the habits of the starter and so on. Athletes who are so prepared will begin the contest with a good feeling of familiarity.

(b) FEAR OF INJURY.

" Fear of injury can have either a foundation (poorly healed injury, staleness, recent recovery from illness, often re-appearing injury) or not (e.g. fear of breaking the pole and so on), but in any case it hinders the best use of all the available energy, because the whole attention is focused at the expectation of an injury. "

" As long as an athlete is not completely healthy or is in the state of staleness he belongs neither in training nor contest. Imagined fear of injuries can be diminished with slowly orienting to the task. Cure by force has success only for robust characters. "

The coach has to eliminate all the possibilities of injuries. He will thus substantially eliminate the fear of these too (e.g. accurate warm-up and conditioning, bring to an end the training in case of illness or staleness).

(c) FEAR OF PUBLICITY.

Some athletes show good form in practice, but they fail if they must work in the presence of a multitude, especially if they are against him (e.g. the opponents' booster-club). He is also embarrassed if he is afraid of appearing ridiculous (e.g. the trousers string threatens to tear). The best remedy is slow accustoming to the mass.

(d) FEAR ABOUT SOCIAL POSITION.

The fear of diminishing or losing the obtained prestige among the fellows or of adverse publicity produces a fear of failure, the so-called "pre-race jitters". It is well known to all competitors. Experience lessens it. But even the great champion has it before a critical contest. (A proverb says: "Who plays about buttons plays quiet, who plays about his life plays excited.")

A little pre-race jitters is a good preparation for the contest, especially for the phlegmatic athlete. But too much produces insomnia, disordered stomach, nervous excitement and so on, and wears down the bodily and the nervous strengths which are needed for the contest. Therefore the coach has sometimes to lessen the pre-race jitters. Means for it are:

(1) Massage - Massage has besides the physical also an excellent psychical effect. It gives the feeling of doing something which is a good preparation for the activity and calms the athlete.

(2) Warm-Up.- All the different, individual kinds of warm-up are good for deadening the pre-race fever.

(3) Psychical diversion - Means for it are: music of phonograph records, songs, fun and anecdotes. Precious for the team is a joker, who produces good humor in critical moments, and so relaxes tensions.

(4) Prevention of intensified pre-race fever: - Methods are: keep aloof from visitors, reporters, autograph hunters, telephone calls and so on.

For athletes who are very excited it is not advisable to look at a thrilling race because this increases their pre-race fever. For phlegmatic persons this may be a good stimulus.

Strong fear is mostly retarding to movement (enervation by fear) but sometimes goads

the athlete. Many runners give their last latent powers when they feel the panting breath of their opponent and fear to lose the race.

(2) VITAL FEELINGS.

(a) GENERAL PLEASANTNESS AND UNPLEASANTNESS.

The reasons for these feelings are different. (e.g. moist and cold weather cause unpleasant feelings). Some people are irritable at electric disturbance in the air, some are sensitive to an unaccustomed climate.

The influence of colors on the feelings has not quite been clear until recent years. Generally glaring colors inflame.

Disquietude of the environment makes one unquiet and interferes with concentration (e.g. it is of importance for a high-jumper and for a sprinter). The coach is often unable to prevent disturbances but he can accustom them to it in training (e.g. start with extraneous noise, jumping at crossing of the run of other and so on).

(b) FEELING OF HUNGER AND THIRST.

Both of these feelings are often not adequate to the physical state. Mostly the coach must warn of too much shortly before a contest (e.g. especially on trips).

(c) FEELING OF PAIN.

Feeling of pain has physical or psychical reasons. In any case the response is negative. They attract the attention to the paining part of body and take the attention away from the contest. Sometimes only a little cause will reduce efficiency (e.g. new shoes which are too small).

(d) MENTAL FATIGUE.

Mental fatigue robs the athlete of the joy for training and competition. It makes one inattentive and is often the first step to an injury. Staleness and bodily exhaustion have effect, but also monotony of the profession or training creates this feeling. The remedies for it are relaxation and variety in the training schedule. A visit to the movies or some other agreeable amusement is a good cure too.

The excited expectation of the contest often creates a feeling of fatigue. But in this case the feeling is usually an illusion. It is only imagined and disappears at the moment of entering into the contest. The coach may convince the athlete that he is physically well-prepared by praising his performance.

(3) TROUBLE, GRIEF AND SORROW.

These feelings are altogether negative. They make one restless, unhappy, unwilling to engage in work. The bodily and mental posture suffers, the athlete becomes flabby, unfit and disinclined to demonstrating physical prowess. Diversion won't always have the intended success. The best remedy is to remove the cause for such feelings. Often this is impossible for the coach.

(4) INFERIORITY COMPLEX.

The inferiority complex is a very stubborn feeling and gives the coach a great deal of trouble. It reduces the joy of aggression, makes one inactive and weakens the accuracy of the movements. The treatment of such a psychosis is protracted. The coach must not give new food to the feeling. He will therefore be chary of rebuke. Where it is necessary he will keep it confidential between himself and the athlete. He will only let athletes who have this feeling enter into a contest where there is a chance of winning. He will increase the psychical pressure slowly. Unfortunately, there are often reactions.

The inferiority complex may arise from lost self-respect too. Neglected training, taking of alcohol and nicotine in spite of advice to the contrary, sexual excess and unfair treatment of the opponent create self-reproaches, and consequently an inferiority complex. In this case self-education

is recommended with the understanding help of the coach.

Sometimes the inferiority complex is masked with contrary feelings. The athlete who has at bottom an inferiority complex is outwardly arrogant, boastful, obstinate and insolent. Freqently this phenomenon is seen in boys during puberty. The boys desire to be men but they feel inferior when face to face with adults. They believe they will get acceptance if they are arrogant and disrespectful. Coaching teenagers is a difficult and responsible task. The coach needs for it much experience and patience.

(5) OVER-CONFIDENCE.

Self-confidence is a positive feeling, which improves the efficiency. But an excess of this feeling converts the effect into the contrary. Over-confidence weakens the eagerness of a profound preparation, makes the form inaccurate and the movements lazy. It diminishes the attention to the contest and underrates the opponent. If the athlete is about to be beaten in a contest after having won, often he will frequently give up without making a real effort to overcome his opponent.

It was mentioned formerly that over-confident athletes need an emphatic admonition to be more careful and aggresive.

(6) NEGATIVE SOCIAL FEELINGS.

(a) EGOTISM.

An egotistical athlete can obtain great individual success but for a team he is valuable only because his personal glory radiates upon the whole school or club. As he is not willing to make sacrifices for the community, he is less valuable for the teamsport. It is very essential that the coach educate him to a team-spirit.

(b) INDIVIDUAL AVERSION.

Sometimes two athletes have a natural antipathy for each other. By reason of it spring many conflicts, especially in teamsport on team trips. Occasionally the pedagogic skill of the coach can convert the feelings of both. Otherwise the coach must eliminate the chance of violent encounters.

(7) RELIGIOUS FEELINGS

Nowadays Olympic Games and other competitions are no longer a religious ceremony as they were in ancient Greece. True religious feelings are therefore of little importance for the sport. But the pseudo-religious feeling of superstition has sometimes great influence on the course of events. There are good-luck symbols and bad-luck symbols which have in the opinion of the athlete decisive importance upon victory or defeat. Many objects can become a "good-luck-piece." A chain for the neck, articles of dress, a certain person or a meeting. Conversely, there are signs and things which bring bad luck. Well-known are the so-called fear-opponents (jinxes) who cause an athlete or a team traditional defeats.

Superstition is independent of the intelligence. Sometimes the coach himself is superstitious. The coach should try to enlighten, to make the symbols ridiculous at a proper moment and to show the symbols are untrue after the unexpected result. Success is not always possible.

IV. EFFORTS TO CHANGE FEELINGSS —

(1) AIM OF THE EFFORTS.

The aim of the efforts is to educate the athlete to become master over his feelings. The coach should try to strengthen the positive, and to weaken - if possible to eliminate - the negative feelings.

(2) THE METHOD.

Proper treatment requires a carefully planned program of action.

All human beings are essentially individuals. No two men are alike in temperament or ability. Consequently treatment must be individualized.

(3) PRELIMINARY CONDITIONS.

(a) The coach must be an expert.
(b) The coach must stay young in heart. He will thereby understand the youth better.
(c) He must be well adjusted emotionally. He has to radiate serenity and cheerfulness. "Joyful the athlete, more joyful the coach", should be the motto for the training.
(d) The coach must watch diligently and accurately the behavior of the athletes in training, in competition, in the community and special situations. He should make notes about his observations. "The best memory is a memorandum."
(e) He has to draw up an objective plan of training, which is based on his observation.
(f) He must insure friendly surroundings. This in regard to the locality and people.

(4) EFFORTS TO STRENGTHEN DESIRABLE EMOTIONS.

(a) Promotion of joy.
(b) Strengthening of self-confidence.
(c) Stimulation of interest and enthusiasm.
(d) Promotion of personal pride.
(e) Engendering a feeling of pleasurable excitement.
(f) Organization of encouragement.
(g) Appeal to social responsibility.
(h) Creation of an atmosphere of confidence in the coach.

(5) EFFORTS TO WEAKEN UNDESIRABLE FEELINGS.

(a) Removal of the causes of undesirable feelings.
(b) Instillment of confidence to combat an inferiority complex.
(c) Practice and diversion to reduce pre-race-fever.
(d) Exhortation against carelessness caused by overconfidence.
(e) Education against superstition.

V. A FINAL OBSERVATION.

Psychical cultivation is an important and interesting task for the coach. It needs love, experience, intuition, industry and patience. The final goal is to create an outstanding athlete who exemplifies the ideal of the ancient Greek: "Always to be the first and a model for others."

ROTATION -- ITS PROBLEMS AND EFFECTS

By H. A. L. Chapman (Hons.)
Scottish National Coach

There will be few people coaching or teaching track and field to-day who don't believe that all movements in the technical sense and problems of training are based upon sound fundamental principles. These principles I divide into three sections - Anatomy, Physiology and Mechanics. Naturally, these three subjects are applied to the event and the individual and form the basis of the technical make-up for each event as well as the background of preparation or condition, which we generally term training. I further believe that any movement or technical detail which doesn't conform to these three basic principles will in all probability be an incorrect one, bearing in mind, of course, its relationship and application to the individual.

Rotation, which is the subject of this paper, is only one part of the question of mechanics and its relationship to track and field. This is a subject which has interested me for some considerable time because of the many points of technique in the various events which are of necessity founded upon the principles of rotation and it seems to me that there is a certain amount of erroneous thought upon this matter. Indeed, I am often considerably alarmed to read and hear quite frequently a number of spurious statements concerning what it is possible for an athlete to do or not to do, particularly whilst in space but also whilst in contact with the ground.

In the jumping events, we get perhaps the widest application of this subject and I propose, therefore, to start off by enumerating three points of principle which I emphasise when discussing the question of jumping generally:-

1. THE FLIGHT PATH OF THE CENTRE OF GRAVITY: The centre of gravity of the human being while high jumping or long jumping describes a certain parabola of flight. This flight path is determined by take-off: in other words, the initial trajectory of the c. of g. on take-off is the resultant of the amount of horizontal momentum which the athlete has generated in his approach and the amount of vertical spring which he is capable of using. Having once set out upon this flight path, there is nothing that can be done by the individual himself to alter the flight path along which he is travelling. External influences might well affect his parabola, for example wind, additional weight, etc., but these latter factors can be ignored for the moment. If an alteration to this parabola is required for any reason, then something must be done to alter the situation at take-off to give a different horizontal relationship between speed and vertical lift to give a different initial trajectory.

2. ACTION AND REACTION: For every movement there must be an equal and opposite movement during flight - in other words, action and reaction. For example, if a long jumper is going through the air in a 'hang' position (Diagram 1.) and decides to change during flight to a 'sail' position, what actually happens is that the upper part of the body is taken forward and downwards, the lower part of the body (lower limbs) forward and upward, and the hips recede relative to the c. of g. without any changes taking place with regard to the parabola of flight - in other words, there is always a compensation taking place in terms of disposition of weight. (See diagrammes 1 and 2). This illustration is, of course, an obvious one in that it can be seen quite clearly taking place, but there are many other movements which the athlete makes during a long or high jump which produce the same effect but which are not so obvious visually. This type of movement may be used by an athlete at any time during flight and doesn't have to be initiated before breaking contact with the ground.

3. PURE ROTATION: If during flight all parts of the body are moving in the same direction (clockwise or anti-clickwise), the movement is said to be of a pure rotational type. In a practical sense, forward or backward somersaults are of a pure rotation type with all parts of the body rotating around the c. of g. in one direction. This action is used in track and field, particularly in high jump and long jump, but the important thing to remember is that such a rotation must be initiated whilst still in contact with the ground. Rotations of this 'pure' type cannot be initiated in mid-flight, except, of course, by the use of external influences. It will be appreciated that a cat if dropped upside-down from almost any height will always land face downwards on all four paws. This movement, which is now known as "catting", is a very complex one and involves the use of various moments of inertia about different axes of rotation and will, of course, produce a rotation through at least 180 degrees in the case of the cat without any previous initiation whatsoever, and, of course, also involves the question of action and reaction, which automatically removes it from the sphere of 'pure' rotation.

These three principles are dependent upon certain basic facts, seven of which I propose to enlarge upon and illustrate their direct application to the various track and field events:-

1. Moments of Inertia.
2. Axes of Maximum and Minimum Moments of Inertia.
3. The Axis of Symmetry.
4. Nutation.
5. The Couple.
6. Translation and Rotation (off centre thrust).
7. Action and Reaction.

1. The Moment of Inertia: Inertia means the amount of force needed to produce acceleration (the object need not be stationary). The actual amount of force is the product of the mass and its distribution (see Diagrams 3a. and 3b.). These two diagrams represent two wheels. 3a. has its mass close to the axis or centre: 3b. has its main mass at the rim of the wheel, or, in other words, as far away from its centre as possible. The wheel in Diagram 3a. will have a small moment of inertia - in other words, it is easy to speed up or easy to slow down in terms of rotation: 3b. has a much greater moment of inertia - it is difficult to accelerate and difficult to stop.

So far I have dealt merely with the principle concerned, but would now like to give an illustration of how it applies to the athlete. For the best practical application of this principle, I use what I refer to as a Frictionless Turntable. This is merely a small turntable on roller bearings, in order that friction should be reduced to the absolute minimum possible, upon which is fixed a small seat. (See diagram 10). The athlete sits upon the seat with his arms out sideways, holding in each hand a 12 lb. shot. The turntable is then revolved at a reasonable speed so that not only the turntable but the athlete plus the shot he is holding are also rotating about a central vertical axis. The athlete then brings both arms towards his shoulders - in other words, bringing the two 12 lb. shot closer to the axis of rotation. As he does so, the speed with which he is rotating increases. The closer to the axis he brings the mass, the faster will the rotation be. If he proceeds to carry out this operation in reverse and take his arms plus shot away from the axis of rotation once again, then the rotational speed decreases.

Let me now apply this principle to the athlete in action in

(a) High Jumping: In one very popular form of the Western Roll the take-off leg after take-off is pulled close to the chest and flexed at the knee. This produces the same effect as in my illustration of the athlete sitting on the turntable - part of the mass of the body is brought closer to the c. of g. about which the body is rotating, thus producing a small moment of inertia and an increase in rotational speed, which in turn produces the effect which is commonly referred to as hip lift.

(b) Discus Throwing: In the first part of the discus turn, whilst the athlete is still in contact with the ground, a rotational speed is generated with the throwing arm extended appreciably from the body. In the middle part of the discus turn when both feet are off the ground, thus eliminating resistance, if the throwing arm and non-throwing arm are brought a little closer to the body or axis of rotation then an increase in rotational speed results (due to a reduction in the moment of inertia). When the athlete lands again at the front of the circle, and resistance is once more produced, this increase in rotational speed can be made use of.

(c) Long Jumping: In the two illustrations so far, (a) and (b), I have instanced situations where an increase in rotational speed is an advantage. In the case of long jumping, however, rotational speed during flight is a decided disadvantage because of the tendency on the part of the athlete to do a somersault and this somersaulting action is a result of the take-off and is due to the fact that the athlete at the moment of leaving the ground has his c. of g. ahead of his take-off foot (see Diagram 7a. and 7b.). In 7a. the trunk is upright at take-off; in 7b. the trunk is leaning forward. The position in 7a. will help to offset this tendency to rotate; in 7b. the position will tend to increase this tendency. During flight, therefore, the long jumper tries to find some means to minimise this tendency to rotate by either performing the 'hang' (see Diagram 1.) or the 'hitch kick' (see Diagram 8.). Both of these actions will, during flight, help to reduce the rotational effect. In the case of the 'hang', this comes about as a result of having the mass of the body in such a position that it is as far away from the axis of rotation as possible, thus producing the greatest possible moment of inertia. In the case of the 'hitch kick', it is the leg action primarily which produces the desired result. On each leg cycle the backward movement is made with the leg straight, which has maximum effect on the upper part of the body in a backward direction (action and reaction) and the forward movement of the leg cycle, which is bent, produces the minimum possible forward effect on the upper part of the body.

It will be appreciated, of course, that the long jumper's aim is to produce the most efficient landing position with regard to the relationship between his point of contact and c. of g. (see Diagram 9.). This diagram shows three positions, (a), (b) and (c), from which it will be quickly appreciated that (b) would produce 100 per cent efficiency from a purely mechanical point of view, but, of course, would be quite impracticable as far as pivoting over the heels is concerned. Illustration (c) shows a compromise between (a) and (b), which is, of course, quite practicable. It is for this reason that the long jumper should be attempting to land with his trunk vertical.

2. The Axis of Maximum and Minimum Moments of Inertia: As far as the human being is concerned, there are a number of principle axes of rotation. In Diagram 4., two of these axes are illustrated - one which runs vertical to and down through the centre of the individual, and the other which runs horizontal. The vertical axis is the axis of minimum moment of inertia (the mass of the body is congregated close to the axis). The axis which runs horizontal is the axis of maximum moment of inertia (the mass of the body being as far away from the axis of rotation as it can possibly be). In Diagram 5 (a), (b), (c), & (d), the human being will be seen in various positions about a verical axis. 5 (a) is, of course, the minimum moment of inertia; 5 (b) shows the individual in a vertical position with arms outstretched and one leg out to the side, which, of course, gives a greater moment of inertia; 5 (c) shows the human being in a horizontal position relative to the vertical axis, which, of course, would produce the greatest possible moment of inertia; and 5 (d) shows an entirely different position, which gives a moment of inertia falling somewhere between 5 (a) and 5 (b). The figures written above each illustration are measurements made in kilogramme/ centimetre seconds to determine the moment of inertia of an object in any particular position about any particular axis, and they serve to show how great or how small a 'moment' may be produced in various positions.

3. The Axis of Symmetry: The axis of symmetry, as its name implies, is the axis about which an object is symmetrically disposed. In the human being, Illustration 5 (a) shows this axis, since relative to such an axis the individual is symmetrically disposed. We also will recall that this axis is the one of minimum moment. In the human being, therefore, the axis of symmetry is also the axis of minimum moment of inertia. In a bicycle wheel, however, or a spinning top, the axis of symmetry is the axis of maximum moment of inertia - a design which is deliberate in construction in order to give maximum stability or gyroscopic effect.

4. Nutation: Let us suppose that an object (a bicycle wheel will serve for this illustration) is rotating about its axis of symmetry. While this rotation is operating, we will apply an external force to the axis to change its position. The immediate result is that the axis of symmetry proceeds to rotate or revolve in a circular path itself, often to be seen taking place in a spinning top when the speed of rotation is diminishing. This movement of the axis of symmetry is termed Nutation. This is not the only way of producing a nutational movement, however. If a high jumper, for example, takes off from the ground with a rotation initiated about two different axes at once (e.g. one about the vertical axis and another about a medial axis) then the moment he leaves the ground his body will proceed to 'settle down' to rotate about either the axis of maximum or the axis of minimum moments of inertia; but all the rotation is not completely taken up in this way - what still remains produces the nutation to which I have already referred.

N.B. If, however, the axis of symmetry is also the axis of maximum moment of inertia, then this axis becomes the preferred axis - in other words, the one about which the body will settle down to rotate. In effect, what has been said is really the principle of the gyroscope and the spinning top, for in each case the axis of symmetry is also the axis of maximum moment of inertia.

In many forms of high jump the athlete leaves the ground with two rotations initiated, with the consequent result that he will proceed to nutate during his flight through the air and also, of course, at the moment of bar clearance. Naturally, the degree of nutation produced will in all probability be quite small and therefore extremely difficult to notice in an actual jump. With ultra-slow motion cine film, however, it can be seen taking place very clearly. If the timing is correct all goes well with regard to the clearance of various parts of the body over the bar. It is therefore of some importance to appreciate very clearly the correct relationship between the preferred axis of rotation and the bar when nutational movements are involved. Diagram 6. shows a series of drawings showing inanimate objects. These objects are, for the purpose of illustration, made of rubber and are of the same density throughout so that the c. of g. represented by the red dot will be in the exact centre of the mass or disposition of mass. The series A., B., C., D. and E., shows this rubber block in various positions - A. on the ground; B. in the air, having been thrust by a force 3 ft. from its original position; C. in the air, but in a horizontal as opposed to a vertical position; D. in the air - this time in a horizontal position either face up or face down (in a symmetrical object this doesn't matter); E. in the air, in a horizontal position, with both ends or extremities having been lowered towards the ground, with the consequent rise of the centre. This

position, if produced to the extreme limit possible, may well result in the c. of g. coming outside the mass of the object itself. The series B., C., D., and E. in the larger illustration show more precisely the actual movements and rotations which have taken place. Diagram C. is, of course, the basis in its simplest form of the Western Roll; D. is the basis of Straddle (belly roll or back layout); E. is the basis of the Eastern Cut Off or a straddle executed at an angle to the bar. All these movements or styles depend very largely upon rotational movement, and rotational movement is affected by the mass of an object and its distribution during flight. Therefore, increases or decreases in rotational speed required during flight at any particular time may be brought about, of course, by decreasing or increasing the moment of inertia of the body about the axis of rotation, which would appear to be very simple; but where so much confusion arises, it seems, is in being able to determine exactly where the axis of rotation really is at any given moment, particularly the moment of bar clearance. This difficulty will probably be the reason why so many straddle jumpers make quite the wrong movements at the moment of clearance. If the body is nutating, as in all probability it will be, then a little thought will be required to ascertain the true axis before any movements can be made correctly, to produce any increase or decrease required in rotational speed. Naturally, this problem becomes more and more acute and more important as the bar is getting higher and the degree of clearance is getting less.

5. The Couple: The couple is really the initiater of all the rotations which we use. If, for example, a bicycle wheel is held by the spindle so that in other words the axis is stationary, and a force is applied at an angle to the rim, the result is that the wheel rotates and all that has been done is to apply 'a couple'. However, if now instead of a bicycle wheel we use a dinner plate or some flat circular object so that its centre of rotation is in no way fixed, and apply a force to the perimetre at a tangent to the edge (not at right angles to the perimetre, of course) two things now result - the object rotates about its c. of g. and also moves in the direction of the thrust, and this is, in fact, referred to as translation and rotation.

6. Translation and Rotation: This is something, of course, which applies to the high jumper and the long jumper also. The long jumper in particular finds this problem worth considering because by virtue of his take-off (Figure 7A. and 7B.) there is some rotation of the body around the c. of g. set up which, of course, it can quickly be seen is detrimental to the long jumper. This is the reason why he has to find some means of preventing or minimising this rotation.

7. Action and Reaction: I have already said something about this particular item, but as a further illustration we can return for a moment to the frictionless turntable. Once again we get an athlete to sit on the seat with both arms stretched out in front of him. The athlete now vigorously moves both arms to the left in a horizontal sweep. The result is, of course, that the remainder of his body, plus turntable, revolves to the right. If we ask the athlete to vigorously bring his arms back again to their original starting position in front of him, we will notice that the body and turntable will revolve back again to their original position - in other words, all that has happened is a pure action and reactionary movement.

It is stated in a number of text books and it is also propagated by theorists that the western roll jumper at the high point of his jump should drop his lower arm down towards the pit, together with his head, with a fairly strong action in order to lift the hips on the other side and thereby increase the rotation of his body as a whole around the bar. This is not possible. Apropos of what has happened on the turntable, we can quickly appreciate that if such a movement is done by the jumper then all that happens is action and reaction - parts of the body on the opposite side of the c. of g. to the arm which is lowered will be lowered themselves relative to the c. of g. (refer to Diagram 6E.). However, this will in every probability not be visible to the naked eye because whereas in the turntable illustration everything was stationary to start with, in the case of the high jumper he is already rotating around his c. of g. by virtue of his take-off. The result is, therefore, that if the left arm, for example, is lowered, then the hips will not be seen to lower on the other side of the c. of g. but appear to continue rising, which, , of course, they do because the body as a whole is rotating but the degree of rise or the speed of rise will diminish and this, as I have already stated, is a very difficult thing to detect visually at normal speed. A slow-motion cine film, however, brings it very much to life.

Whilst on the subject, the turntable can be used to illustrate a number of different items.

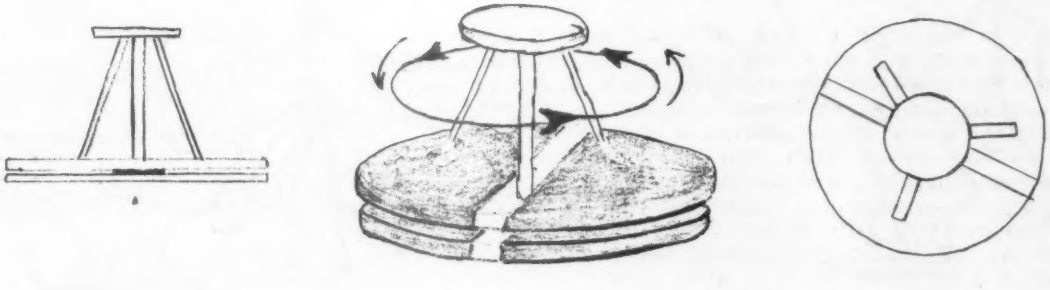
The hurdler can stand on the turntable with his trailing leg behind him and then proceed to bring that trailing leg round to the side in its correct semi-circular sweep. The result is, of course, that the remainder of the body turns to meet the leg - action and reaction once again. This, of course, serves to show the considerable importance of an arm action helping to counter-balance this movement.

The discus thrower can stand on the turntable in the throwing position and then proceed to make a throw. The result, of course, is a violent twist in the middle as his feet and hips turn to meet the arm which is swinging forward, thus illustrating very readily the necessity for a firm base from which to apply the power.

If the athlete lies on his side on the seat of the turntable and proceeds to reproduce a running action with his legs, then the turntable will begin to revolve, so that the athlete himself revolves backwards. It will be noted that the leg action has to be pretty rapid in order to produce even the smallest amount of backward rotation. The reason for this backward rotation is simply that as a result of the running leg action the c. of g. of the body as a whole is being constantly changed, which has the effect of producing this slow, but nevertheless distinct, backward rotation. The reason, of course, why the c. of g. changes its position relative to the body, and also, of course, to the ground, is that the body is virtually in contact with the ground. In space, however, this is not the situation at all because now there is no form of resistance whatsoever and the hitch-kicking action produces the stabilised upright trunk position by virtue of the long backward sweep and the short forward sweep of each leg, previously mentioned.

With regard to hurdling, we find this problem arising in connection with the body dip. One of the principal objects of the hurdler is to keep his c. of g. from rising unduly as each obstacle is cleared to save time at each clearance, to avoid unnecessary losses in speed, and, of course, to enable him to spend as much time as possible sprinting on the ground. One of the ways, of course, by which the hurdler tries to keep his c. of g. low is by dipping over the hurdle. Many hurdlers dip, or at least perform a vast proportion of the dip, after they have left the ground. Any movement of this nature, when the contact has been broken, produces compensatory movements on the diagonally opposite side of the c. of g. but in no way affects the flight path or parabola of the c. of g. If the hurdler is going to travel too high over the hurdle, no amount of dip at this stage will prevent it. In other words, the dip must be done, at least 90 per cent of it anyway, before the athlete leaves the ground. Once again we have had, therefore, an example of how rotational principles and the problems of movement in space determine a correct technical action, or perhaps one ought to say the correct timing of a technical action.

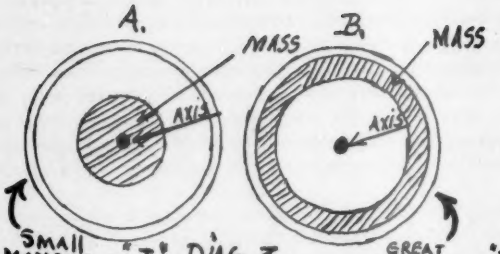
I started this dissertation by mentioning the three basic features of Anatomy, Physiology and Mechanics and stated that in my opinion every movement and position should bear some relationship to these three. I hope that I have been able to illustrate what this relationship is from the point of view of rotation and its allied subjects. Obviously there is a great deal more that could be said upon this subject but I hope that this will be sufficient to bring out my trends of thought in this connection, since I am one who firmly believes that if the coach fully understands the mechanical, physiological and anatomical implications which lie behind the polished track and field performance we will achieve quicker results with far less time wasted. I also believe that the whys and wherefores of each track and field event present a fascinating study, which, if used correctly, will undoubtedly help to stimulate interest in this particular branch of sport.



TURNTABLE WITH DETACHABLE SEAT.

DIAG. 1

DIAG. 2.



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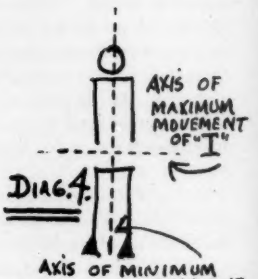

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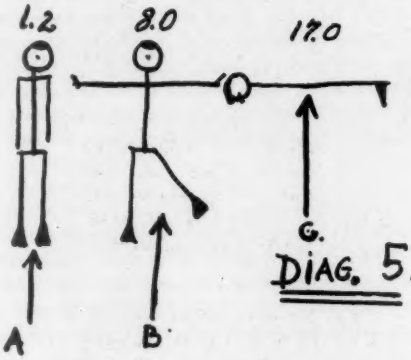

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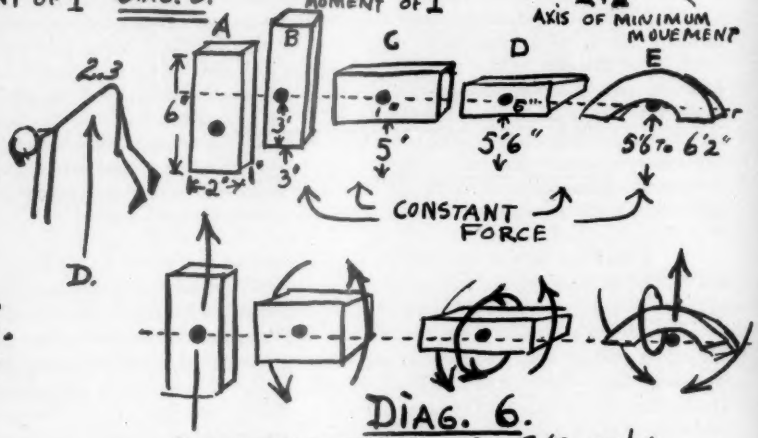
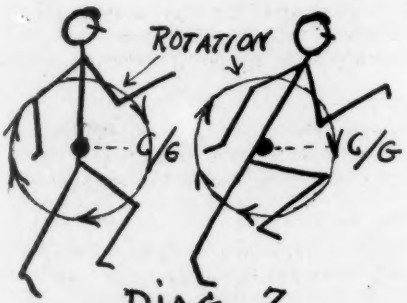


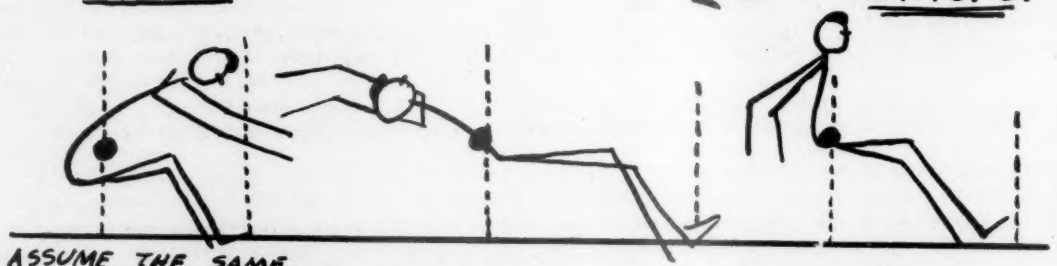
DIAG. 6.

B. UPWARD THRUST OF C/G ONLY
C. " " C/G + LATERAL PURE ROTATION.
D. " " CG + LATERAL + LONGITUDINAL
E " "CG+ LATERAL + LONGITUDINAL + ACTION + REACTION.



DIAG. 7.

DIAG. 8.



ASSUME THE SAME FLIGHT PATH IN EACH CASE

DIAG. 9.

DON CANHAM

A STUDY OF STRIDE LENGTH IN RUNNING

by: Kalevi Rompotti
Finland

INTRODUCTION: Running is a basic sport event, with fans in every country in the world. Any athlete needing good physical condition, even though as passive as a marksman, must run. Organized track competitions follow the rules of the International Amateur Athletics Federation in specifying 41 different running distances for men and 14 distances for women, a total of 43 different running distances, from the 60 yd. dash to the marathon. As it is the simplest sporting event, we have reasons to suppose that there are more runners and fans of running than represented by other sport.

In observing the best runners of the world, a careful observer can see that some run with a longer stride and slower rhythm, whereas others prefer to run with a shorter stride but a faster rhythm. Nowadays we find that most better distance runners are using a shorter stride and faster rhythm, while the longer stride is remaining more and more in the background. What is, then, the most economical stride length? This question is important for every athlete, especially all runners.

We know, for example, that if we run with too long or too short a stride, we fatigue quickly. Occasionally we can find runners who have worked out several years without finding their best stride length, but this is noticeably more common among young runners and other field men who run very little. (It may be that the instinctive ability of the people to use the most economical stride length, automatically, is decreasing due to the fact that nowadays we are using mechanized transportation more and more.) If we could say directly to the athlete that his stride is too long or too short we could help him accelerate his development as an athlete.

PROBLEM: The main purpose of this study has been to try to find the limits between which we could place the normal running stride length and then to compare stride length to the height of the person. In other words: What is the ratio of stride length to height? Height is chosen as the basis of comparison because preliminary studies have indicated that height has marked influence upon the stride, and because the height is a simple, precise, and common measurement.

We can suppose that the stride length may also depend upon many different subordinate factors: for example, upon the running style, the skill, upon the looseness and relaxation of the hips, maybe upon the temperament. However, it is very hard to measure the influence of this kind of factor. Instead, this study has tried to look for correlations of stride length with (a) the height (b) the leg length (c) the weight (d) the speed.

This study has also tried to reach some general conclusions about stride length as it relates to running rhythm. This study attempts to indicate experiments and lines of investigation regarding possible research upon the most economical stride length for walking or marching, which has distinct military importance.

RELATED STUDIES: Related studies concerning this subject were made by some of my students in 1955 at the University of Helsinki. These studies, which are continuing, have seemed to indicate that:

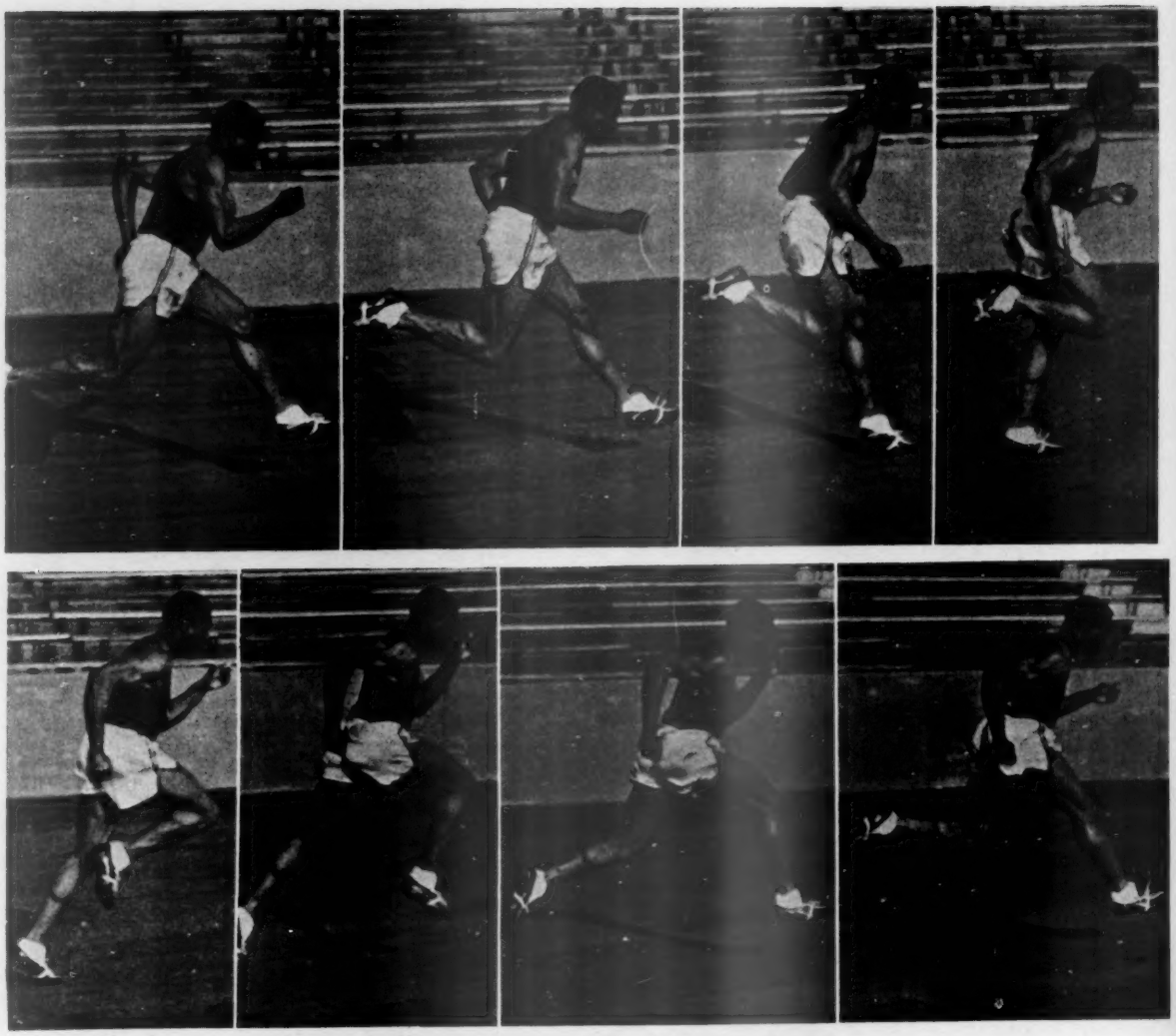
(1) The height of runners has rather a high correlation with the stride length. Correlation coefficient 0.71.
(2) The leg length has a moderate significance. Correlation coefficient 0.54.
(3) The speed has no significance. Correlation coefficient 0.05.

The study was made on 40 male students, 20 of whom were relatively more experienced. One purpose of the present study has been to extend and interpret the results of these earlier studies.

PROCEDURE:

Subjects studied: Twelve of the best male runners of Stanford University, who we can suppose have found their most economical stride length.

Stride Length measurements: The measurements have been performed at Angel Field and in the Stanford stadium on windless days during April and May, 1956. The measurement area of 16m was



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marked on the track with two lines. The length of 16m (about 53 feet) is chosen according to the studies of Franklin Henry which indicated that the runner is able to maintain his full speed for about 15-16m (at most). (The Athletic Journal, February, 1952, No. 6). The measurement area was brushed clean so that it was easy to measure the stride length by the marks made by the spike shoes of runners. The measurements were performed by two men with a steel measure, from the mark of the fore spikes to fore spikes. Since, according to Henry's study, acceleration to full speed requires about 45m (Athletic Journal, No. 6, Feb. 1952), a third line was marked 45m from the main measurement area (MA) as a guide for the runners. The runners could take a longer or shorter approach than 45m, provided that they had reached full speed by the beginning of the MA, as indicated by a uniformity in stride length. All stride lengths in the MA were included in the data -- generally 7-9 strides.

To study the influence of speed upon stride length, runners were asked after a good warm-up to run once to the MA with full speed and once with "half speed," a speed chosen by the runner as relaxing and easiest to run. The difference between stride lengths at full and "half" speeds were then taken into consideration, along with speed differences. After running, the leg length (heel to top of the thigh bone) was measured. Height and weight were taken from the prospectus of the Department of Athletics and Physical Education (March 12, 1956). This information was checked with the runners themselves. Results were then tabulated.

Personnel:

1 man on the first line	Starter
3 men on the second line	Timers and measurers

THE HANDLING OF MATERIAL: The experimental results from the above procedure are studied statistically, using the standard formula for correlation. Because there were four different variable factors (height, leg length, speed, and weight), four correlation analyses were needed. Formula used was:

$$r = \frac{\frac{Ex^1y^1}{N} - (Cy)(Cx)}{\frac{(\delta x)}{i}\ \frac{(\delta y)}{i}}$$

r = correlation
E = sum of
x = scores
y = scores
C = correction $(\frac{Fd}{N})$
δ = standard deviation
i = size of step interval

Stride Length Coefficient: The stride length coefficient was determined as follows: (a) The average length of 7 strides was taken; (b) a stride length was chosen which was taken 2 or more times. If there was no one stride length which occurred twice, the middle stride in the series was chosen. The average of these two stride lengths (a) and (b) was then taken. The ratio of stride length to height was next computed, and expressed as a percentage. The mean of these percentages was taken, using the formula

$$M = AM \frac{+ Efd}{N} xi$$

where M = mean
AM = assumed mean
f = frequencies
d = deviation
E = sum of
Efd = sum of fd column
N = number of cases
$\frac{Efd}{N}$ = correction
i = size of step interval

Then the coefficient = $\frac{\text{mean}}{100}$

The data for the 20 best runners from the study made in Helsinki were included in this study, so that

N = 32 Efd^2 = 309
AM = 115 M = 117
Efd = +35

Coefficient = 1.17

or standard Deviation was computed using the formula:

$$\delta = \sqrt{\frac{Efd^2}{N} - \frac{(Efd)^2}{(N)}} \quad xi$$

Since δ = 5.8, this means that about 70% of stride lengths, according to this study, are included between 6 units on either side of this coefficient -- that is, between coefficients of 1.23 and 1.11. In practice, this means that the normal full-speed running stride-length usually falls within the limits 1.17 x Ht $\pm$ 10 cm (or 4").

Actual data shows that stride lengths are always inside the extreme limits represented by coefficients of 1.3 and 1.05. In practice, therefore, if stride length in full speed is more or less than 1.17 x Ht $\pm$ 25 cm (10 inches), we have reason to believe that stride length is either too long or too short. The stride length coefficient in half speed is 1.22, but because δ = 8, this coefficient is not absolutely precise. Stride length in half speed can be said to be, however, between limits of 1.22 x Ht $\pm$ 15 cm.

STRIDE LENGTH AS A FUNCTION OF HEIGHT

Ex^1y^1 = +54
Cy = +0.92
Cx = +1.17 r = 0.46~0.5
δ y = 3.06
δ x = 2.54
N = 12

Height has, according to this study, a moderate influence on the stride length.

STRIDE LENGTH AS A FUNCTION OF LEG LENGTH

Ex^1y^1 = +43
Cy = +1.17
Cx = +0.25 r = 0.55~0.6
δ y = +2.51
δ x = +2.50
N = 17

According to this study the leg length has a moderate influence on the stride length. The correlation coefficient agrees well with the Helsinki Study (0.54).

STRIDE LENGTH AS A FUNCTION OF WEIGHT

Ex^1y^1 = -22
Cy = -0.75
Cx = +1.17 r = -0.2
δ y = 2.0
δ x = 2.54

According to this study, the weight has only a slight influence on the stride length; in general, the more weight, the shorter is the stride.

STRIDE LENGTH AS A FUNCTION OF SPEED: Because Ex^1y^1 = 0, we see that there is no correlation between speed and stride length. Also, a fast man can run with a longer or shorter stride than a slow man, as earlier studies have indicated.

A stride length study of full and half speeds, however, proves clearly that in most cases, when a man lowers his speed to "half" (on the average, 1.1 m/sec; time difference for 16m average 0.27 sec) the stride elongates on the average 5-6 cm (2.5").

According to this study of 12 cases, in 9 instances the "half speed" stride was longer; in 2 cases about the same; and in 1 case the "half speed" stride was shorter.

RUNNING RHYTHM: This study has shown that an even stride length is the exception. In only 4 cases of the 24 studied were 3 or more even strides taken (three cases were in full speed, 1 case in half speed).

Seven - nine stride lengths of 12 men were studied in full and "half" speed and this showed that the difference between the longest and shortest strides may average as much as 10 cm (4"), both in full and half speed. The difference between two sequential strides averages 5 cm (2") and is likewise the same in both speeds. When the running rhythm is very even, the difference between the longest and shortest strides is 2 1/2", 6 cm and between two sequential strides, 2 -5 cm.

The runner seems to have different stride lengths for left and right feet, so that every second stride is evenly longer or shorter. A good example is the rhythm of one hurdler whose strides were: 7 - 0, 6 - 11, 7 - 1, 6 - 11, 7 - 2, 6 - 11, 7 - 1, 6 - 11. This kind of even rhythm was found in 13 of 24 cases (12 full and 12 half speed). There was not a clear running rhythm in 7 cases, but in 4 cases it was even (i.e., 3 or more even sequential strides).

Running in full speed is more even, since 3 cases of the 4 where even sequential strides were found, were in full speed; and 5 cases from 7 where there was not a clear running rhythm were in half speed. The longest measured stride in that study was 8 - 4" = 254 cm; the shortest, 6 - 4" = 193 cm.

LIMITATIONS : This study, which is only a partial study, has included 12 runners who have been rather young (average 21), and who have worked out on the average 5 1/2 years. The final purpose is to get data from bigger groups of athletes who have an average of 7-8 work-out years behind them. The purpose is also to study whether there are marked differences in the stride lengths and rhythm of inexperienced and experienced runners.

FINAL CONCLUSIONS:

1. The normal full speed running stride length is 1.17 x Ht $\pm$ 10 cm or 4'.
2. If stride length in full speed is more or less than 1.17 x Ht $\pm$ 25 cm or 10', we can conclude that the stride length is either too long or too short.
3. Height has moderate influence on the stride length (r = 0.5).
4. The leg length has a moderate influence on the stride length (r = 0.6).
5. The weight has a very slight influence on the stride length (r = -0.2).
6. Speed has no influence on the stride length. A fast man can run with a longer or shorter stride than the slow man. However, the stride length of the same man in relaxed "half speed" averages 2.5" or 5-6 cm longer than in full speed.
7. A perfectly even stride length is rather rare. Three runners of 12 were able to take 3-4 even sequential strides. As a rule, the difference between two sequential strides in both full and "half" speed is 5 cm or 2".
8. The difference between longest and shortest strides in full and "half" speed averages 10 cm or 4". In many cases runners seem to have two stride lengths -- different stride lengths for right and left foot. This kind of even running rhythm was found in about half of the cases.
9. Running in full speed is more even than in "half" speed.

STRIDE LENGTHS

1. Cobb

R.		H.	
R.	7-0	R.	6-10
	6-11		7-1
	7-1		7-0
	6-11		7-0
	7-2		7-3
	6-11		7-2
	7-1		7-4
	6-11		7-7[x]
	7-7[x]		
	3/1-3		6/0-3

2. Luttrel

F.		H.	
R.	7-2	R.	7-3
	7-2-1/4		7-1/2
	7-1/2		7-2-1/2
	7-2		7-0
	7-1/2		7-1-1/4
	7-2		7-1
	7-1		7-4
	7-4		7-2-1/2
	3-1/2/0-1-1/2		4/0-3

3. King

F.		H.	
R.	6-10	R.	6-9
	6-7-1/2		6-10
	6-10		6-7-1/4
	6-6-1/2		6-9
	6-9		6-6-1/2
	6-6-1/2		6-9
	6-9-1/2		6-7-1/2
	6-7-1/2		6-9
	6-9-1/2		6-7-1/2
	3-1/2/2-3-1/2		3-1/2/1-2-1/2

4. Sims

F.		H.	
R.	7-3	R.	7-3
	6-7		7-1
	7-4		7-4
	6-9		7-1
	7-1		7-4
	6-11		7-1
	7-3-1/2		7-5
	6-10-1/2		7-2
	9/2-9		4/2-4

5. Saras

F.		H.	
		N.	6-9
R.	6-6 3/4		7-1/4
	6-4 1/2		6-7 1/4
	6-7 3/4		6-11 1/2
	6-6 1/4		6-7
	6-8 1/2		6-8
	6-6 1/2		6-10 1/2
	6-11[x]		6-8 3/4
	4/1 1/2-3 1/4		5/1-4 1/2

6. Strong

F.		H.	
R.	6-9	R.	6-4
	6-10		6-6 1/2
	6-8 1/2		6-4 1/2
	6-10		6-6
	6-10		6-6 1/2
	6-11 1/2		6-6 3/4
	6-10		6-6
			6-7
	3/0-1 1/2		3/1/4-2 1/2

7. Chesarek

F.		H	
R.	7-9	R.	7-10
	7-11		7-11
	7-10		8-3
	7-11 1/2		8-0
	7-10		8-3
	8-2[x]		8-1
	2 1/2/1-2		5/1-4

8. Seebold

F.		H.	
R.	6-7	N.	7-0
	6-6		7-1/2
	6-10		7-0
	6-8		6-9
	6-11		6-11
	6-10		6-10
	6-11 1/2		6-11
	6-10		7-0
	7-3[x]		
	5 1/2/1-4		3 1/2/1/2-3

9. Graves

E.	7-1	E.	7-4
	7-7		7-7
	7-5		7-7
	7-5		7-7
	7-5		7-7
	7-6		8-1[x]
	7-3		
	6/0-6		3/0-3

10. Nelson

E.	7-6 1/2	N.	7-8
	7-6 1/2		7-7 1/2
	7-6 1/2		7-8 1/2
	7-6 1/2		7-6 1/2
	7-6		7-10
	7-9 1/2		7-11 1/2
	7-11[x]		8-0
	3 1/2/0-3 1/2		5-1/2/1/2-3-1/2

11. Roldan

E.	7-2 3/4	N.	7-3 3/4
	7-1/2		7-3 1/2
	7-3		7-5 1/2
	7-3		7-7 1/2
	7-3		7-6
	7-3 1/4		7-10 1/2[x]
	7-4 3/4		
	4/0-2 1/2		4/1/4-2

12. Carls

N.	7-6 1/4	N	8-1 1/4
	7-6 3/4		7-10 1/4
	7-8 3/4		8-3 1/2
	7-7 3/4		8-3 1/2
	7-7 3/4		8-1 1/2
	7-8 1/4		8-2
	2 1/2/0-2		6/0-5

Notes:

1. F= Full Speed
2. H= Half Speed
3. R= Even Two Stride Lengths Rhythm
4. N= No Clear Rhythm or Rhythm Breaks
5. E= Several Even Strides
6. x= Runner has started too slow down at end of M.A. This stride is not included in the stride length difference counts
7. 3/1-3; 3" = difference between longest and shortest stride of set.
8. 1" - 3" = smallest and largest difference between two sequential strides.

DATA OF STUDY MADE IN HELSENKI UNIVERSITY WHICH JOINED TO THAT STUDY WHEN COUNTING STRIDE LENGTH COEFFICIENT

Cases	Height cm.	StrL cm.	Full Speed StrL % from Height	Speed m/sec
1	174	185	106	9.1
2	168	189	113	9.1
3	173	224	129	10.0
4	172	211	123	9.1
5	180	216	120	9.1
6	169	190	113	9.1
7	176	211	120	9.1
8	181	200	111	8.3
9	180	212	118	9.1
10	174	197	113	9.1
11	167	182	109	9.1
12	183	213	117	10.0
13	177	207	117	9.1
14	171	188	110	8.3
15	183	216	118	9.1
16	173	200	116	10.0
17	171	190	111	9.1
18	169	195	115	10.0
19	177	200	113	9.1
20	172	194	113	10.0

Cases	Full Speed StrL. % from Height	Half Speed StrL. % from Height	Full Speed StrL. % from Leg Length	Half Speed StrL. % from Leg Length
1	121	235	212	215
2	112	216	194	173
3	124	251	206	222
4	116	218	191	191
5	115	218	203	207
6	130	249	221	228
7	114	204	198	196
8	115	213	205	211
9	127	231	217	222
10	117	198	204	194
11	126	228	219	226
12	115	206	201	212
	M = 117	M = 122